Assessment Procedure Consultation

P344 'Project TERRE implementation into GB market arrangements'

P344 seeks to align the Balancing and Settlement Code (BSC) with the European Balancing Project TERRE (Trans-European Replacement Reserves Exchange) requirements. This is in order to allow the implementation of the project at national level and be compliant with the first tranche of obligations stemming from the European Network Codes (ENCs).

This Assessment Procedure Consultation for P344 closes:

5pm on **Tuesday 14 March 2017**

The Workgroup may not be able to consider late responses.

This Modification is expected to impact:

- BSC Parties
- Non-Balancing Mechanism participants
- Transmission Company
- Central Registration Agent (CRA)
- Balancing Mechanism Reporting Agent (BMRA)
- The Funds Administration Agent (FAA)
- Half Hourly Data Aggregators (HHDAs)
- Settlement Administration Agent (SAA)
- Supplier Volume Allocation Agent (SVAA)
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Phase

Initial Written Assessment

Definition Procedure

Assessment Procedure

Report Phase

Implementation

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About This Document

The purpose of this first P344 Assessment Procedure Consultation is to invite BSC Parties and other interested parties to provide their initial views on the high level solution principles that have been developed by the Workgroup to BSC Modification P344. The P344 Workgroup will then discuss the Consultation responses, before a second round of Industry Consultation that will cover the P344 solution to a greater level of granularity.

There are three parts to this document:

- This is the main document. It provides details of the solution, impacts, costs, benefits/drawbacks and proposed implementation approach.
- Attachment A contains the P344 Modification proposal form.
- Attachment B contains the specific questions on which the Workgroup seeks your views. Please use this form to provide your response to these questions, and to record any further views or comments you wish the Workgroup to consider.

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1 Summary

Why Change?

Project TERRE is an advance implementation project, being developed by a group of European Transmission System Operators (TSOs), including National Grid. It is intended to fulfil requirements on TSOs included in the European Electricity Balancing Guideline (EB GL). Among other things, it requires those TSOs that use Replacement Reserve (RR) to implement and make operational a European platform for the exchange of energy from RR, by two years after entry into force.

The EB GL is expected to come into force this year. The TERRE go-live date is currently scheduled for Q3/Q4 2018 and the intention is that the GB market will be available to participate from this date. Cost benefit analysis performed for the TERRE project indicated net benefits for GB consumers.

Preceding Modification P344, Issue 60 'Interfaces between the European Balancing Project TERRE and the current GB market arrangements' was closed because no firm conclusions could be reached. The expectation was that the Modification process will provide the structure for a Workgroup to devise a solution.

What is an RR Acceptance?

An RR Acceptance is an acceptance issued to National Grid (in relation to a GB BSP) by the TERRE algorithm.

Solution

Key features of the Workgroup's solution are as follows. Note that these may be subject to change following this first Assessment Procedure Consultation:

1. The scope of the solution is limited to:
    - TSO-Balancing Service Provider (BSP) Settlement i.e. payments made to GB BSPs (by National Grid via ELEXON Clear) to settle RR Acceptances issued by Project TERRE.
    - Inclusion of RR acceptance volumes in Imbalance Pricing and determination of imbalances.
    - New BSC provisions to facilitate voluntary inclusion of current non-Balancing Mechanism (BM) Balancing Providers within the TERRE process using a subset of the BM and BSC provisions, including adjustment of host Supplier imbalance volumes.
2. It does not include the following, which fall outside of P344 scope:
    - TSO-TSO payments required under Project TERRE (i.e. payments between National Grid and non-GB System Operators (SOs) required in order to settle cross-border flows scheduled by Project TERRE);
    - Payments between GB parties and National Grid required to fund RR Acceptances. We anticipate that these will be recovered through existing Balancing Services Use of System (BSUoS) charges, as part of the Daily System Operator BM Cashflow (CSOBM).
3. Cash flows between GB parties relating to Project TERRE will be in pounds sterling (GBP) rather than euros (EUR). In particular:
    - Replacement reserve (RR) bids submitted to National Grid by GB BSPs will be priced in GBP;

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- Payments to or from GB BSPs (and the corresponding payments from or to National Grid) will be calculated and invoiced in GBP; and
- Any mutualisation payments required from BSC Parties (in the event of payment default by a GB BSP) will be calculated and invoiced in GBP.

Because the central TERRE arrangements operate in EUR, National Grid will need to convert GB BSP's RR bids from GBP to EUR, and convert the clearing price published by Project TERRE back from EUR to GBP. These conversions will be carried out using an exchange rate published in advance for each Settlement Date. Section 3 below ('Currency Conversion') provides further detail.

4. National Grid will issue megawatt (MW) profiles to GB BSPs despatched by TERRE (as it does to participants despatched in the Balancing Mechanism (BM)). These MW profiles will take into account declared plant dynamics, and GB BSPs will be required (by section BC2 of the Grid Code) to follow instructed profiles, in the same way that they are required to follow Bid-Offer Acceptances (BOAs) issued in the BM. Self-despatch within balancing timescales of BM Units participating in TERRE will remain prohibited. For clarity, this document refers to BOAs under the BM and RR Instructions under Project TERRE collectively as instructions. Section 3 below ('Despatch Principles') provides further detail.
5. In order to allow National Grid to issue MW profiles to GB BSPs, the BSPs must provide National Grid with a 'Physical Notification' i.e. the MW profile which they intend to follow in the absence of any instructions issued by National Grid. As a result, the P344 solution does not include rules for using historic data to establish a baseline demand for Demand Side Response (DSR). DSR will be measured against the Physical Notifications provided by the GB BSP (in those periods in which an RR Acceptance is issued to the DSR).
6. RR Acceptances issued by Project TERRE are financially firm. This means that, in terms of Settlement, the GB BSP will always be paid (or pay) for an RR Acceptance. It also means that the RR Schedule for delivering that RR Acceptance will set a new baseline from which future instructions will deviate. We anticipate that National Grid will usually issue a corresponding despatch instruction, which we call the RR Instruction (although in some circumstances this may not be issued). Even if the RR Instruction is issued, subsequent instructions can still have an 'undoing' effect (i.e. when National Grid later identifies instructions in the opposite direction on that unit which are desirable and feasible to balance the system efficiently). National Grid notes that issuing subsequent instructions to 'undo' will not be the normal and will likely be a last resort based on the most economic and efficient balancing of the system. This is consistent with the current BM, and with the provisions of the January 2017 version of the Electricity Balancing Guideline (EB GL). Section 3 below provides further detail.
7. The Workgroup-devised P344 solution seeks to allow direct participation by customers and aggregators[1] (who currently can only participate in the Balancing Mechanism through Additional Supplier BM Units registered by the licensed Supplier(s). In order to allow this (and to ensure such parties are on a level playing field with other BSPs) new arrangements may be introduced for registration of 'Virtual BM Units', and for the imbalance positions of Suppliers to be adjusted for actions taken by their customers as a result of despatch by National Grid. Virtual BM Units may also be able to participate in the BM, if they wish to. Section 3 below ('Facilitating participation by customers and aggregators') provides further details. National Grid has not confirmed that it is able to open up the BM to current non-BM providers at this stage and therefore, it cannot be confirmed that the BM will definitely be opened up under the P344 solution. The P344

What is an RR Instruction?

An RR Instruction is a MW profile instruction sent to a GB BSP that would normally follow the RR Schedule, but is settled like any other instruction (like under the BM).

What is an RR Schedule?

An RR Schedule is a MW profile issued to Settlement by National Grid to activate them following receipt of an RR Acceptance from TERRE. Its Acceptance Time will be set to the deadline for BSP submission of TERRE bids to National Grid and sets a baseline upon which subsequent instructions deviate.

[1] These parties have historically been referred to as 'non-BM' providers, but this terminology is no longer appropriate in the context of P344, which will allow them to participate in the BM.

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solution may be subject to further changes before the second round of Industry Consultation, should the BM not be opened up to current non-BM participants under the P344 solution.

Impacts & Costs

ELEXON will be submitting the high-level Impact Assessment to its service provider on 22 February 2017, the same time at which this first Industry consultation period begins.

The costs and scale of final impacts of the P344 solution will be detailed in the second round of Industry Consultation, following the results of the service provider Impact Assessment and first Industry Consultation phase.

Implementation

National Grid is seeking to utilise RR Products for energy balancing in GB from TERRE go-live, which is currently scheduled for Q3/Q4 2018. It therefore hopes that the implementation timescales of P344 will align with this date. The Q3/Q4 2018 implementation timescale is currently the working assumption for the Modification.

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2 Why Change?

What is Project TERRE?

Project TERRE is an advance implementation project that forms part of the implementation of the European Electricity Balancing Guideline. Project TERRE aims to harmonise the TSO dispatch of RR across several TSO areas (Great Britain, France, Switzerland, Spain, Portugal and Italy - Ireland and Greece are currently observers). It will do this by introducing a common TERRE product, consisting of 15 minute blocks of upward and/or downward energy volumes, which will be similar to current GB products such as BSC Bid-Offers or Short Term Operating Reserve (STOR) submissions.

The TERRE go-live date is currently scheduled for Q3/Q4 2018 and the intention is that the GB market will be available to participate from this date. As all current GB balancing products feed into the BSC calculations of imbalance prices and volumes, the Proposer considers that the relevant RR Acceptances should do so too, as soon as they start to be used as part of GB balancing. This will require changes to the GB market arrangements (BSC and/or balancing services arrangements).

What is the European Electricity Balancing Guideline?

The Electricity Balancing Guideline (EB GL) will provide a framework to enable cross border balancing markets. This will facilitate the sharing of balancing resources between TSOs to boost security of supply and reduce cost. It includes provisions for: procurement of balancing services, cross-zonal capacity for balancing services and cross border (XB) settlement.

What is an RR Product?

RR products must be compliant with TSOs requirements and meet 12 criteria, which are set out below:

1. Full activation time (FAT) of 30 minutes.
2. Preparation period from 0 to 30 minutes.
3. Ramping period from 0 to 30 minutes.
4. Minimum quantity of 1 MW.
5. Minimum delivery period of 15 minutes or multiples of 15 minutes (i.e. "blocks").
6. Maximum delivery period of 60 minutes.
7. Location (bidding zone) – this will be Great Britain for parties bidding into TERRE in respect of GB-based generation or demand.
8. The validity period as defined by Balancing Service Provider (BSP) but equal or less than 60 minutes.
9. The recovery period as defined by BSP (time before another activation is possible).
10. The maximum bid size will be:
    - in case of divisible offer (part-acceptance possible), no maximum is requested.
    - in case of indivisible offer (all or nothing acceptance), the local rules will be implemented.
11. Bid divisibility will be under the responsibility of BSP. The bid volume:
    - Min volume (resolution): 1MW.

What are Balancing Services?

Balancing services are used by the Transmission Company in its role as System Operator (SO) to balance supply and demand in real time. These are also used in the calculation of imbalance prices (also known as cash-out prices).

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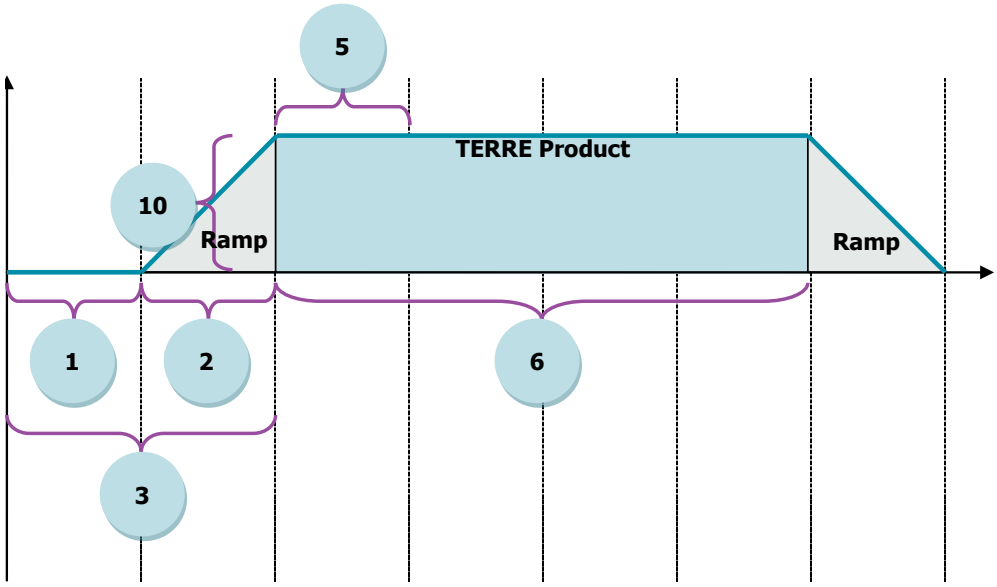
- Resolution after common merit order (CMO): 0.1MW[2].
- For indivisible bids (not applicable for divisible bids).

12. Price of submitted bids/offers: the cap and floor prices will be compliant with the local market rules[3].



Structure of a standard balancing product

The Workgroups preference is that the structure of a standard RR balancing product will look like the example in the above picture. The numbers correspond to the relevant RR Product criteria. Further detail of the structure of the RR balancing product, including potential alternatives depending on the central TERRE project can be found in section 3.

TERRE Settlement

For each 15 minute period, TERRE will settle with a clearing price rather than pay as bid. In essence, all BSPs across all TERRE TSO participation areas will be settled using a single clearing price that is calculated centrally by TERRE.

Overall GB implementation approach

National Grid worked in collaboration with the Department for Energy and Climate Change (DECC)[4], Ofgem and ELEXON on determining the GB implementation approach to the EB GL. This group defined implementation options and developed assessment criteria. The GB implementation approach seeks to maximise the exchange of cross border (XB) products in a manner that is proportionate and recognises the specific needs of the GB balancing regime. These were then discussed with stakeholders at an industry workshop in January 2015.

[2] Having a resolution of 0.1MW means that in case an offer is partially accepted (e.g. pro rata), the value will be rounded at the value with one decimal number.
[3] TSOs are seeking harmonisation of caps and floors.
[4] Now the Department for Business, Energy and Industrial Strategy (BEIS).

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Common European Electricity Market and GB Specific Products

Ultimately, it was decided to proceed with the option of common European Electricity market and GB specific balancing products operating simultaneously. Under this option, European standard products are introduced into the GB market with expectation they will replace some of the volume currently provided by GB-specific products. This would mean that the number of GB specific products would be reduced (for instance, the removal of SO to SO trades). However, some GB balancing products will be retained in order to meet balancing requirements not met by standard products (e.g. BOAs) in the GB BM.

Current BSC arrangements

The implementation of Project TERRE is expected to impact a number of BSC areas including (but not limited to):

- The calculation of Trading Parties' Imbalance Volumes.
- The rules regarding Interconnectors under the BSC.
- The timing of BMRS data publication and/or BSC Settlement Runs.
- Default rules for missing or late TERRE data.
- The publication of information on the BMRS relating to Imbalance Price calculations and GB-related RR Product Acceptances.
- Non-delivery charges.
- Credit calculations.

It will also bring current non-BM providers into the BSC arrangements in order that they can participate in the TERRE product.

Settlement timescales and reporting

Currently under the BSC, Settlement data is reported to BSC Parties (including BM participants) in various Settlement reports produced by BSC Central Systems e.g. the SAA. These reports are produced in a pipe-separated 'NETA' (New Electricity Trading Arrangements) file format and distributed via File Transfer Protocol (or high grade dedicated communication lines for paying Parties).

Settlement data is published in accordance with the BSC Settlement timetable:

BSC Settlement timetable		
Settlement Run	ID	Average timing (Working Days after Settlement Date)
Interim Information Run	II	5
Initial Settlement Run	SF	18
1st Reconciliation Run	R1	37
2nd Reconciliation Run	R2	82
3rd Reconciliation Run	R3	152
Final Reconciliation Run	RF	290

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NETA reporting

The implementation of Modification P114 'Entitlement of Licence Exemptible Generators (LEGs) and other Non-trading Parties to BSC Membership Without Evidence of Trading' meant that non-BSC Parties can apply to receive the SAA-I014 (sub-flow 2) for each Settlement Run under licence, granted on a case-by-case basis by ELEXON in accordance with the BSC (further information).

In addition to NETA Settlement reports, disaggregated data is published to the market via the Balancing Mechanism Reporting System website. Under the current arrangement in the BM, National Grid sends Bid-Offer data to BMRS shortly after Gate Closure for a given Settlement Period, with publication soon afterwards. National Grid also sends Acceptance data to BMRS shortly after being instructed. BMRS publishes both types of data shortly after receipt from National Grid.

EU reporting requirements

Aggregated balancing data is reported via BMRS (and ENTSO-E's EMFIP) in accordance with Article 17 of the Transparency Regulation. See Modification P295 'Submission and publication of Transparency regulation data via the BMRS' for further information.

Article 12(2) in the January 2017 draft of the EB GL requires each TSO to publish various information on balancing energy bids. ELEXON proposes that these requirements are satisfied by publication of such information on BMRS.

BM Settlement arrangements

Under the BM, National Grid can issue MW profile instructions to a BM Unit to deviate from a MW baseline. This baseline is the BM Unit's Final Physical Notification as modified by any previous instructions. For a given Settlement Period, it can issue these instructions between Gate Closure and the end of that Settlement Period. These instructions should respect physical and dynamic data (intended output level, maximum/minimum limits, ramp rates etc.) that the BM Unit submits to National Grid.

For each instruction received, Settlement calculates Offer or Bid Acceptance Volumes based on the difference between that instruction and a baseline. BM participants are settled (i.e. paid or must pay) on the basis of these volumes. The baseline is the Final Physical Notification (FPN) as modified by prior instructions, meaning that if there are no instructions at a given point in time, the baseline equals the FPN.

Instructions have a sequential BOA Number set by National Grid. This is important as National Grid can make a series of 'revisions' to what it wants the BM Unit to do, through a series of instructions (some of which may 'undo' a previous instruction). Settlement processes instructions in order of BOA Number, with an intention that they are processed in the time order that instructions were issued.

Imbalance pricing

Under the current arrangements, individual Actions (e.g. Accepted Bids and Offers under the BM) are ordered and subject to various calculation steps such as Flagging, Tagging and repricing. Because the central TERRE system cannot state whether a given RR Acceptance is to meet a GB or foreign need, Settlement cannot simply isolate those taken for a foreign need and ensure they are initially unpriced. This will necessitate a degree of

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aggregation in terms of the Actions that are introduced into the pricing calculation for TERRE.

Credit, invoicing and payment default

There may be cases where a BSC Party (possibly an Aggregator) fails to pay their Balancing and settlement Code Company (BSCCo) or Trading Charges invoices. Under the current arrangements in the BSC, all other BSC Parties are required to pay for these amounts under a Default Funding Share mechanism (i.e. mutualisation payments), based on their market share of Credited Energy Volume. This means that aggregators would not be subject to Default Funding Share as they would not have Credited Energy Volume associated to them (similar to Non-Physical Traders under the current arrangements).

Contingencies - Black Start

A black start event is an event whereby the Transmission Network has shut down and requires a series of localised start-up activities (without relying on the Transmission Network), leading to restoration of normal operation.. Section G 'Contingencies' of the BSC states that a Market Suspension Period will exist during:

- a Total Shutdown (as defined in the Grid Code) or;
- a Partial Shutdown (as defined in the Grid Code) that also meets the Market Suspension Threshold (essentially means that national demand is 95% less than previously forecasted).

During a Market Suspension Period, the Balancing Mechanism is suspended in addition to the following:

- No compensation to BM participants for BM outages
- Energy Contract Volume Notifications (ECVNs) are suspended
- A single imbalance cash-out price applies (calculated by BSCCo and approved by Panel, based on the cash-out prices in the previous 30 days)
- Credit Assessment Energy Indebtedness (CEI) and Metered Energy Indebtedness (MEI) are set to zero
- Actual energy Indebtedness (AEI) (for Settlement Days within the Market Suspension period) is set to zero

Issue 60

Issue 60 'Interfaces between the European Balancing Project TERRE and the current GB market arrangements' was raised by National Grid on 8 June 2015. It was raised so that an Issue Group could consider each of the areas above. It also aimed to determine how these may impact the current BSC arrangements and what solution(s) could be progressed under a Modification to implement any necessary changes.

The Issue Group met six times between July 2015 and March 2016. At times the Group split up into smaller groups which ran in parallel.

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The considerations of the Group focused on two broad areas in relation to the interactions with the TERRE platform:

- the settlement of RR product acceptances
- the effect on Imbalance Prices.

Issue 60 Conclusions

Issue 60 was closed because no firm conclusions could be reached. The expectation was that the Modification process will provide the structure for a Workgroup to complete the work.

It was then proposed that the Modification needed to be raised by National Grid promptly to ensure that BSC Systems would be ready for end to end testing (at the point of Issue 60, this was scheduled for autumn 2017). National Grid therefore raised P344 Project TERRE implementation into GB market arrangements' on 1 June 2016.

What is the issue?

National Grid is expecting to utilise RR Products for energy balancing in GB from TERRE go-live. As noted previously, this is currently scheduled for Q3/Q4 2018. As all current GB balancing products feed into the BSC calculations of imbalance prices and volumes, so should relevant TERRE Products too, as soon as they start to be used as part of GB balancing. This will require changes to the GB market arrangements (the BSC, the Balancing Services arrangements or both).

P344 Workgroup

The BSC Panel agreed with ELEXON's recommendation on the progression of P344 through a two-stage Assessment Procedure. Under 'stage 1', the Workgroup would consider the following four areas. This was to better inform the scope and progression of the P344 Assessment Procedure proper under 'stage 2'.

Stage 1 areas for consideration:

- What is within the scope of the BSC changes and what is definitely not within scope?
- What are the external dependencies under the BSC that need to be established before a solution can be developed?
- What external resources and expertise are needed by the Workgroup?
- What is the further progression timetable needed by a Workgroup?

P344 scope

Under P344, TERRE is expected to run alongside the existing BM. As such, the following areas are within the scope of P344:

- BM Units can submit bids into both mechanisms.

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- RR Bids are accepted by a central TERRE algorithm (to meet both cross-border and GB needs).
- BM Bid-Offer Acceptances are made by National Grid (to meet GB needs left unsatisfied by TERRE).

This will mean that the following will be outside the scope of P344. These will need to be considered by other (non-BSC) governance bodies before Project TERRE can be implemented in GB. However, the Workgroup does not believe that these need to be raised and determined before 'stage 2' commences. Broadly, these areas include the cost of:

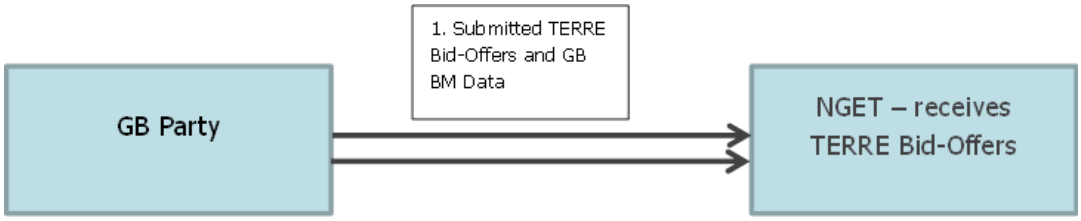
- the RR Acceptances used to balance GB system is recovered through Balancing Services Use of System (BSUoS); and
- cross-border RR Acceptances settled between TERRE TSOs.

Areas not within scope of P344 Proposed

During 'stage 1', the Workgroup considered a number of approaches to Project TERRE that would allow BSPs to participate in TERRE without themselves submitting TERRE Bids to National Grid. These approaches rely on National Grid (or a third party) converting Bid-Offers (submitted by the BSP into the existing BM) into TERRE Bids. These approaches would not change the process for settling TERRE Acceptances (but would potentially reduce the barrier to participation in the new arrangements). Options considered were as follows:

Option 1: Parties send TERRE Bid-Offers to National Grid (P344 Proposed)

Under this option, the GB party constructs TERRE Bid-Offers however it wishes.



Option 2: Parties send TERRE Bid-Offers to National Grid but these are constructed first by a third party

Parties use third party to construct TERRE Bid-Offers, but still send direct to National Grid. As far as National Grid is concerned there is no real difference from Option 1 as the use of the third party is not visible.

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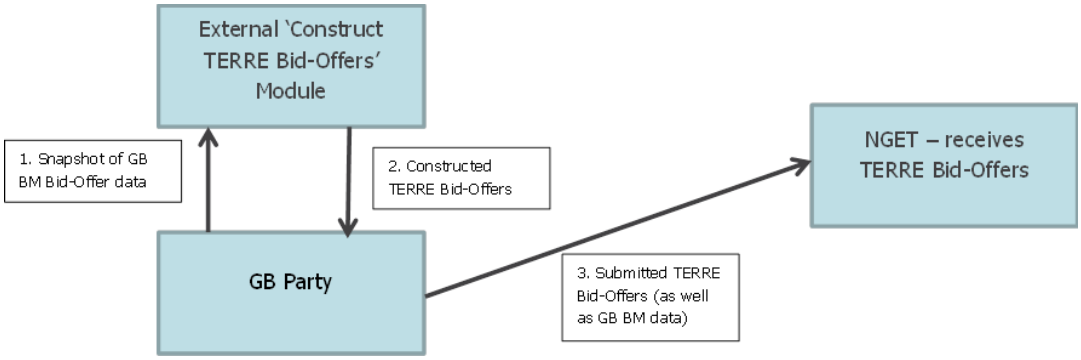
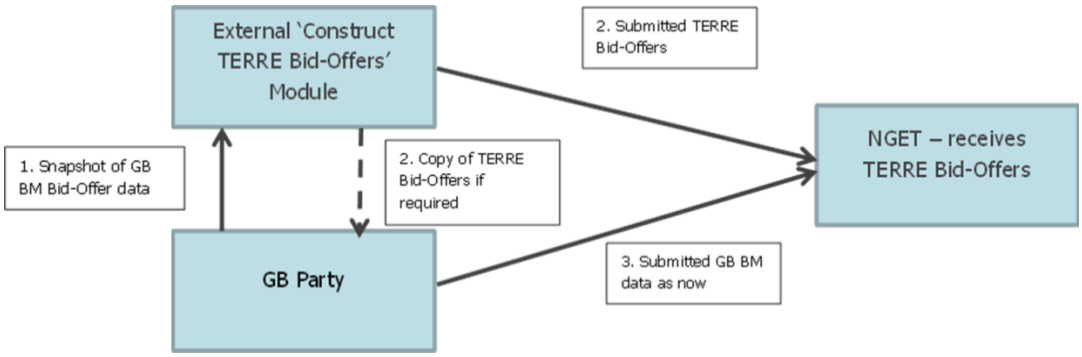


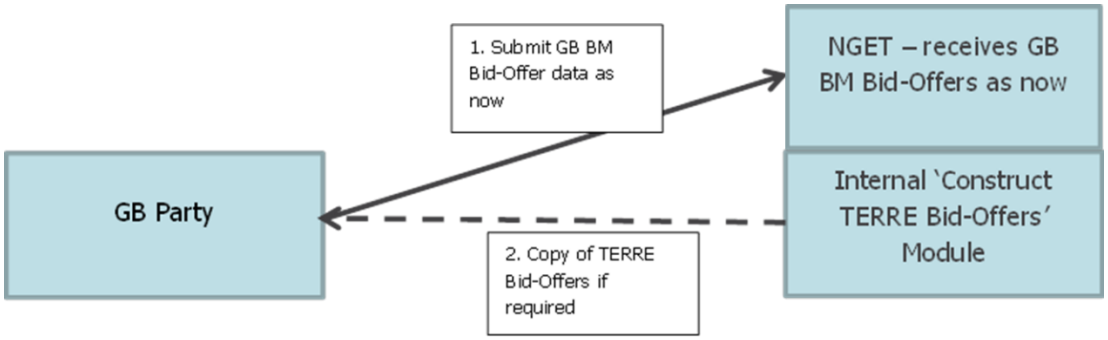
Option 3: Parties use a third party construct and send TERRE Bid-Offers to National Grid

Under this option, TERRE Bid-Offers are sent to National Grid via third party.



Option 4: National Grid constructs TERRE Bid-Offers on behalf of Parties using codified rules

Under option 4, National Grid constructs TERRE Bid-Offers for GB Parties. This could be an optional or mandatory for all (linked to funding).



The Workgroup believes that options 2, 3 or 4 could potentially be progressed as additional options for participation in TERRE ('TERRE Plus'), but they do not affect the P344 solution. Given that they relate to processes for submitting TERRE bids (rather than settlement), they can be progressed (if required by parties) outside the scope of the BSC.

National Grid as the Proposer prefers to progress Option 1 as it was originally proposed. However, National Grid advised that it would provide guidance and support to market participants in understanding how they go about translating their technical characteristics into explicit RR bids. National Grid has also advised that it does not support Option 4 for the following reasons:

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- National Grid is legally obliged as the TSO to allow BSPs to submit bids for standard products therefore this possibility will not meet any legal obligations.
- If implemented as an interim arrangement prior to the obligations in the EB GL coming into effect then there will be a need to change twice.
- Even if the TSO was able to fully reflect the technical parameters of BM Units in the RR bids, BSPs may still want to submit separate prices given the different settlement arrangements (pay as bid vs pay as clear).
- Does not constitute a level playing fielding between BM and non-BM Units and between GB BSPs and foreign BSPs also participating in TERRE.

During 'stage 2' of Assessment for Modification P344, it was confirmed that TSO-TSO payment default is out of scope for P344.

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3 Solution

Proposed solution

P344 proposes to align the BSC with the European Balancing Project TERRE (Trans European Replacement Reserves Exchange) requirements. This is in order to allow the implementation of the project at national level and be compliant with the eventual obligations in the European Network Codes and Guidelines. (Note that for these purposes we are currently assuming that 'Brexit' will not impact National Grid's participation in TERRE.)

As an outcome of the Issue Group 60 a straw-man was developed, which described the high level business process within GB. As this highlighted key areas of current processes which will need to change, it formed the basis for this Modification Proposal.

ELEXON and National Grid have since built on this, developing the "TERRE Impact Assessment", which considered the business requirements across GB, including the BSC.

This set the basis for a series of Workgroup meetings under 'stage 2' of the Assessment Procedure, where the Workgroup developed the solution. The following portrays the principles of the solution to date, and it is these principles that we seek the industry views on as part of this Industry Consultation.

Key Assumptions

There are a number of key assumptions that have been made in order to develop the P344 solution to date. These assumptions have been made as it was important to progress the BSC changes in order to support the TERRE product as soon as possible to ensure that the required BSC amendments can be implemented to align with central TERRE go-live. The Workgroup developed the solution to P344 whilst recognising that parts of the solution may need amendment should there be any significant changes imposed from the central TERRE project or EB GL.

It is currently understood that there will be a greater level of clarity over the assumptions noted below before the second round of Industry Consultation on P344.

The key assumptions underlying the current proposed P344 solution are as follows:

1. In a number of key respects, the proposed P344 solution is modelled on the existing BM arrangements. The Workgroup believes that re-using existing processes in this way will simplify the implementation, and make it easier to operate the two balancing markets simultaneously. However, in taking this approach the Workgroup has made the assumption that key decisions on the nature of TSO-BSP Settlement can be made at the national level (i.e. that TSO-BSP Settlement arrangements will not be strongly harmonised across member states, at least initially). If this assumption proves incorrect, further work may be required to align the P344 solution with any harmonised requirements for TSO-BSP Settlement.
2. Workgroup discussions have assumed that the run-up and run-down 'ramps' scheduled by National Grid will be in addition to the raw 'block' accepted by TERRE.

   For example:

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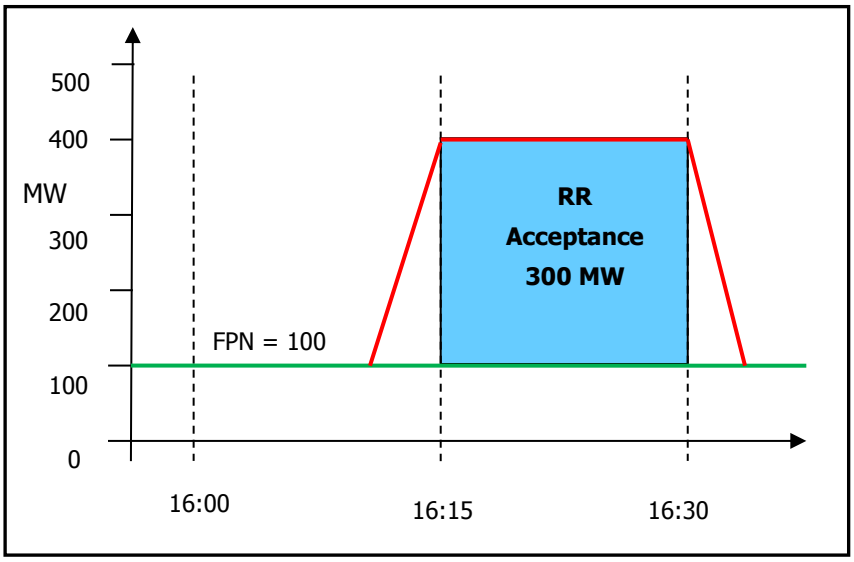
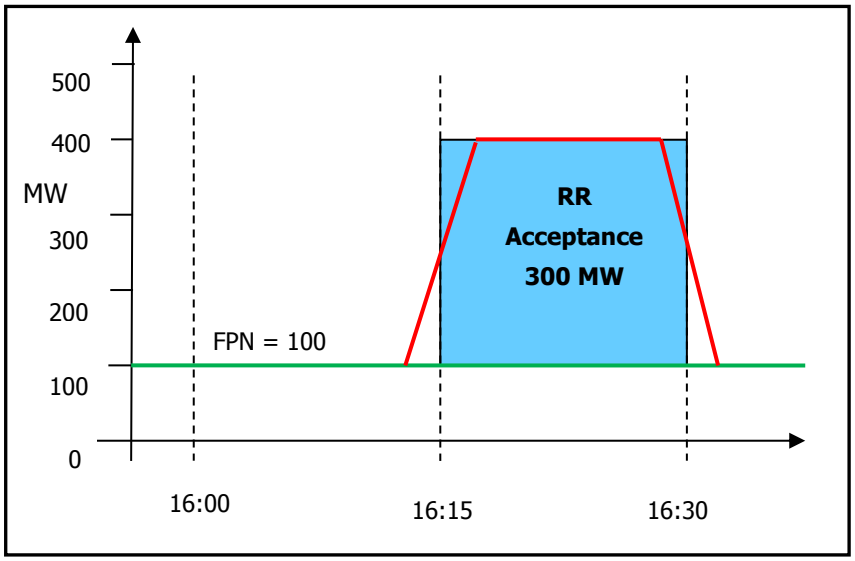


This approach implies that GB BSPs will need to take the cost of the additional ramp volume into account when submitting their prices (bids to TERRE) (i.e. the £/megawatt hour (MWh) price they submit will be the price for one MWh of 'block' energy, plus the associated ramp volumes). This **is** the approach proposed by the P344 Workgroup.

An alternative option would be for National Grid to treat some or all of the ramp volume as delivering the RR Acceptance, so that the GB BSP is not required to price in ramps as well as the 'block'. Under this model (which **is not** the one proposed by the P344 Workgroup) the MW profile despatched by National Grid might look more like this:



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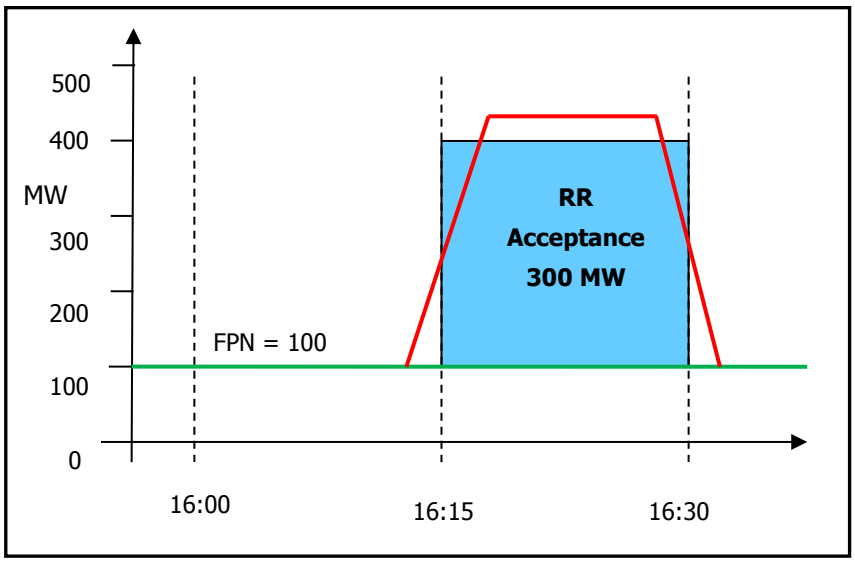
The Workgroup also considered an approach whereby the volume of the RR Schedule should match the RR Acceptance 'block' within the quarter-hour:



In this example, this approach means that the maximum output level would be higher which could pose a risk of breaching the BM Unit's Maximum Export Limit (MEL).

We recognise that harmonisation of ramping principles with other countries is important to ensure a level playing field for BSPs. For instance, if GB BSPs were required to take into account ramps under approach 1 above when pricing, whereas foreign BSPs following approach 2 above, this would give foreign BSPs a price advantage.

Currency conversion

The P344 Workgroup proposes that GB BSP settlement should take place in pounds sterling rather than in euros. The process proposed under the P344 solution is be as follows:

- At the day-ahead stage, ELEXON will calculate (under a transparent process) and publish the exchange rate to be used for all transactions on the following Settlement Day. The procedures for deriving this exchange rate – such as which financial service provider(s) will provide exchange rate data – should be documented in a transparent process and be maintained under BSC governance.
- National Grid will use this exchange rate to convert prices submitted by GB BSPs from £/MWh to €/MWh (before passing them on to the central TERRE platform).
- National Grid will use the same exchange rate to convert the clearing prices published by TERRE back to £/MWh before passing them to the BMRA (for publication to parties) and SAA (for use in settlement).

Section 6 of this paper details the rationale for these proposals.

What is EDL and EDL*?

EDL is National Grid's balancing software that sends notifications to parties in order that the balancing service provider can deliver balancing volumes on the GB network. EDL* is the replacement to EDL.

Despatch principles

The P344 Workgroup believes that the question of how National Grid should despatch BM Units to deliver RR Acceptances lies as much within Grid Code governance as it does with BSC governance. However, feedback from the Grid Code Development Forum (GCDF) meetings that discussed TERRE (on 6 October and 7 November 2016) was that the Grid Code process would benefit from (and was waiting for) a steer from the P344 Workgroup on how despatch and settlement would work. For this reason the P344 Workgroup has

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discussed despatch at some length, with a view to documenting high-level principles that can form a starting point for the Grid Code 0097 Workgroup 'Grid Code Processes Supporting TERRE'. The proposed principles are as follows:

PRINCIPLE 1: Despatch of BM Units within balancing timescales will remain the responsibility of the System Operator, not GB BSPs.

P344 proposes that National Grid should remain responsible for despatching BM Units within balancing timescales. GB BSPs should endeavour to follow their Final Physical Notification (FPN) in accordance with Section BC2.5.1 of the Grid Code, unless instructed otherwise by National Grid. An instruction to deviate from FPN will typically take the form of a MW profile issued to the BM Unit's Control Point over Electronic Dispatch and Logging (EDL) (or its replacement EDL*). In most cases National Grid will issue an instruction that delivers the TERRE acceptance (i.e. corresponds to the accepted block, plus ramps consistent with the run-up and run-down rates declared by the BSP for that BM Unit). However, there may be circumstances in which issuing a physical instruction directly corresponding to the TERRE Acceptance is not possible or appropriate.

We assume that TERRE Acceptance results are received by National Grid around 35 minutes prior to the start of the hour (i.e. 10-15 minutes after National Grid submitted GB need to TERRE). Due to TERRE operating on an hourly basis, whereas Settlement (and the BM) operates on half hourly basis, there are issues around availability of final data for the second Settlement Period in a given hour, at that point in time. This is known at the 'beyond the wall' issue and is covered in further detail in Appendix 1.

National Grid's view of GB need maybe be different at that point, and dispatching a BM Unit in accordance with a TERRE Acceptance may be undesirable. Further, dispatching a BM Unit which has been accepted under TERRE could cause system issues (e.g. locational constraints). For these reasons, the Workgroups assumes that National Grid will not always instruct a BM Unit strictly to meet an RR Acceptance. In the context of P344, three separate notifications will be issued when Project TERRE accepts an offer from a GB BSP:

1. The central TERRE algorithm will send to National Grid details of the 'block' volume it has accepted. This notification (referred to by the P344 Workgroup as an "**RR Acceptance**") will **not** take account of the Run-up and Run-down rates declared to National Grid by the GB BSP;
2. National Grid will construct and send to Settlement a MW profile that the GB BSP would be required to follow in order to deliver the RR Acceptance. This profile (referred to by the P344 Workgroup as an "**RR Schedule**") will respect the Run-up and Run-down rates declared to National Grid by the GB BSP.
3. National Grid can (and we anticipate will in most cases) also issue an "**RR Instruction**" to the BM Unit's Control Point, which is functionally similar to a BM BOA. As an instruction, it will use a baseline of the FPN as modified by any prior instructions and the RR Schedule (therefore any instructed deviations with Acceptance Times prior to the RR Schedule, the RR Schedule and then any instructed deviations with Acceptance Times later than the RR Schedule). This means that an RR Instruction that exactly matches the RR Schedule will result (for Settlement purposes) in zero Accepted Offer/Bid volume (assuming no instructions with Acceptance Times after the RR Schedule). Where National Grid issues an RR Instruction that deviates from the RR Schedule, this will create Accepted Offer/Bid Volume/s which will be subject to Bid-Offer prices under the BM. In cases where National Grid does not issue any instructions with Acceptance Time later than that of the RR Schedule, Settlement will deem an 'undo' Accepted Bid/Offer Volume, subject to BM Bid-Offer prices. This is done on the basis that National Grid is implicitly instructing the BM Unit to maintain

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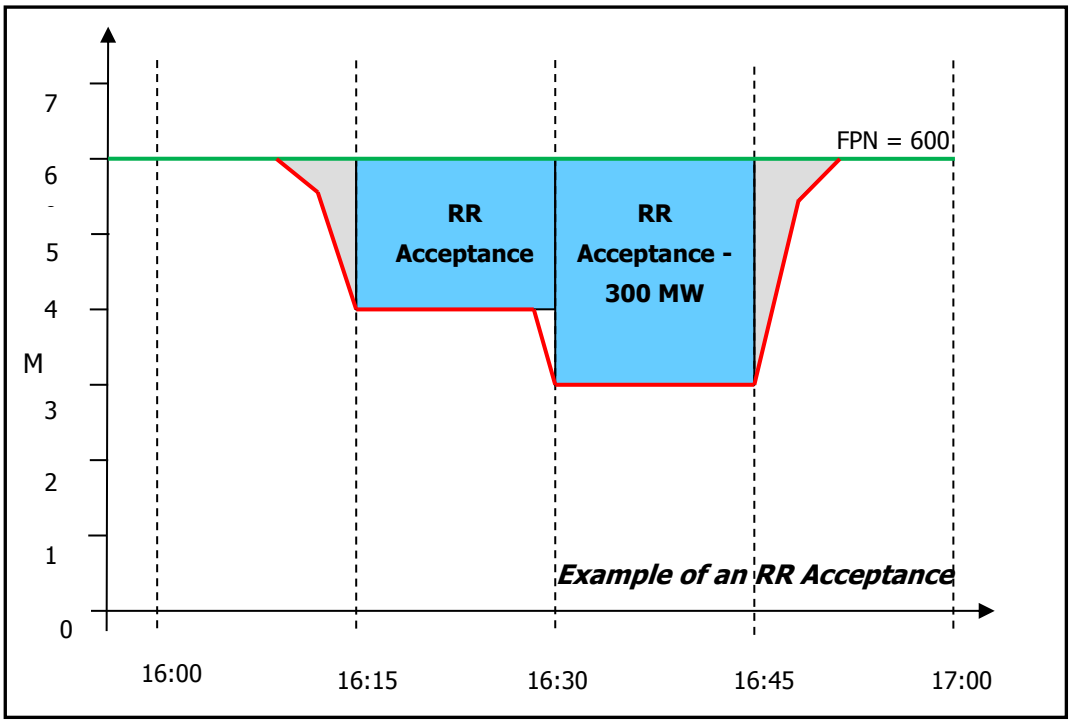
the baseline as at the time deadline for BSPs to submit their TERRE bids to National Grid.

The figure below provides a simple example. The BM Unit's FPN is at 600 MW the green line, but TERRE issues RR Acceptances (the blue 'block's) that reduce this by 200 MW between 16:15 and 16:30; and by 300 MW between 16:30 and 16:45. National Grid issues the corresponding RR Schedule and matching RR Instruction (the red line) that the BM Unit should follow in order to deliver the RR Acceptance:



In practice we understand that National Grid will issue the RR Schedule and RR Instructions shortly after receipt of the RR Acceptance results from the central TERRE system. We assume that RR Acceptances will be received approximately 35 minutes before the start of each hour, and an automated National Grid process (within the Electricity Balancing System (EBS)) will then construct the corresponding RR Schedule, issuing this to BSPs and Settlement prior to 30 minutes before the start of the first quarter-hour that the BSP can be activated.

Instructions will continue to be issued to the BM Unit Control Point using the EDL (or EDL*) mechanism, and should be handled similarly by the Control Point. Data will continue to be submitted to Settlement under the existing communication method used for BOAs under the BM.

PRINCIPLE 2: RR Acceptances are financially firm

The RR Acceptance 'block' will always be paid to/payable by the GB BSP at the TERRE GB clearing price for that quarter-hour. National Grid will always construct an RR Schedule, with unpaid ramps (so GB BSPs should account for ramps in their pricing as previously noted), so that Settlement maintains the relationship between RR Acceptances (plus ramps) and instructions as firm.

Settlement will treat the RR Schedule like an instruction (except not paid Bid-Offer prices for the volume) with an Acceptance Time matching the time deadline for BSPs to submit their TERRE bids to National Grid. This ensures that the RR Schedule is based on a baseline of the Physical Notification (PN), as modified by instructions prior to that deadline. This also means that any instructions between that time and results being received back

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from TERRE would be treated as changes to the new baseline set by the RR Schedule. See Appendix 1 for further explanation of this approach.

If at the time of receiving results from TERRE, National Grid decides that the RR Schedule is not required they will not issue the RR Schedule as an instruction to the BM Unit Control Point. Where this is the case, and there are no later instructions, Settlement will deem an 'undo' Accepted Bid-Offer Volume in the opposite direction, paid (or requiring payment) at Bid-Offer prices. This is consistent with the operation of the BM (where BOAs can be undone by a subsequent BOA).

This also highlights the importance of treating the RR Schedule as an instruction. In figure 1, for example, the BSP will be paying the TERRE clearing price to National Grid, in return for reducing their level of output. Assume National Grid do not issue any instructions. If we did not treat the RR Schedule as setting the new baseline, there would be no deemed 'undo' Accepted Offer Volume (paid at BM Offer prices) and the BSP would be left out of pocket.

PRINCIPLE 3: National Grid can affect an amendment to an RR Instruction by issuing subsequent BM BOAs

Once National Grid has issued the RR Schedule, we assume National Grid will issue an actual instruction to the BM Unit Control Point to follow that MW profile. If this instruction exactly matches the MW profile of the RR Schedule, it will result in zero Bid-Offer Acceptance Volume.

National Grid could issue an instruction that doesn't exactly match the RR Schedule and the differences between the two would result in Bid-Offer Acceptance Volume, settled at Bid-Offer prices. It might do this for various reasons, such as to alleviate local constraint issues. National Grid could affect an amendment by issuing further instructions; however each instruction could result in Bid-Offer Acceptance Volumes.

Facilitating participation by customers and aggregators

The P344 solution is required by the EB GL to allow participation in TERRE by customers and aggregators. Historically these parties have been referred to as 'non-BM' participants, because current industry rules prevent them from registering BM Units or participating directly in the BM. This constraint arises because (under current BSC rules) only the licensed electricity Supplier supplying electricity to premises is permitted to register a BM Unit containing the Import Metering System at the premises. However, the Workgroup suggests that P344 should remove this constraint (and allow customers and aggregators to participate in the BM as well as TERRE).

Please note that National Grid has not confirmed that it is able to open up the BM to current non-BM providers at this stage and therefore, it cannot be confirmed that the BM will definitely be opened up under the P344 solution. In any case, in order for any party to participate in the BM, it also needs to comply to the relevant obligations as set out under the Grid Code.

Section 6 of this paper provides further information behind the Workgroup's proposals.

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Assessment Consultation Question
Do you believe it would be appropriate for the P344 solution to remove constraints and allow aggregators/customers to participate directly in the Balancing Mechanism (i.e. not via a Supplier)?
The Workgroup invites you to give your views using the response form in Attachment B

A new BSC participation capacity

P344 proposes that all GB RR Acceptances (including those from 'non-BM' participants) should be settled under the BSC. To facilitate this, such parties will be required to sign up to the BSC (so that the BSC becomes the contractual framework through which they are paid). However, such parties will not be participating in core BSC processes to the same extent as Suppliers or Generators, and this needs to be reflected in the obligations placed upon them (which should be appropriate and proportionate to the limited capacity in which they are participating in the BSC).

To clarify this, consider a customer who chooses to provide RR through an aggregator (rather than their Supplier). Some of the BSC responsibilities relating to that customer transfer to the aggregator, but many of them remain with the Supplier, as summarised in the following table:

Table 1 – Division of BSC Responsibilities Between Supplier and Third Party Aggregator

BSC Right or Obligation	Responsible Party
Offer customer's flexibility into TERRE	Aggregator
Receive (or make) payment for RR Acceptances	Aggregator
Pay (or be paid) Imbalance Charges in relation to energy flows at the premises (other than those related to RR Acceptances)	Supplier
Make bilateral contract notifications in relation to energy flows at the premises (other than those related to RR Acceptances)	Supplier
Initial Settlement metering at the Boundary Point	Supplier
Pay network charges in relation to energy flows at the premises	Supplier

The Workgroup proposes the term "**Virtual Lead Party**" for this new BSC participation capacity, because (as described below) the way such parties participate in TERRE is by registering "Virtual BM Units" containing the Metering Systems whose flexibility they will be bidding in to TERRE. As illustrated in Table 1 above, the Workgroup proposes that imbalance settlement remains the responsibility of the customer's Supplier, rather than the Virtual Lead Party. The Virtual Lead Party will not be a 'Balance Responsible Party', will not be required to pay Energy Imbalance Charges (except possibly in relation to Non-Delivery of Acceptances, as discussed below), and will not have access to the tools (e.g. Energy Contract Volume Notifications) that Balance Responsible Parties use to manage their imbalance positions.

For the avoidance of doubt, there will be nothing to prevent a BSC Party acceding to the BSC both as a Virtual Lead Party, and as a Supplier or Generator. For example, a company that functioned both as a licensed Supplier and an independent aggregator would sign up to the BSC both as a Supplier (in order to supply customers with electricity), and as a

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Virtual Lead Party (in order to aggregate customers' flexibility without supplying their electricity).

Aggregators (and other 'non-BM' participants) signing up to the BSC for TERRE purposes will be BSC Parties, but not 'Trading Parties'.[5] This will limit the obligations with which they are required to comply, as many (but not all) BSC obligations apply only to BSC Parties who are also Trading Parties.

Assessment Consultation Question
The Workgroup proposes to use the term "Virtual Lead Party" for a customer or aggregator who bids flexibility into TERRE without supplying electricity to (or buying electricity generated at) the premises in question; and "Virtual BM Unit" for a collection of Metering Systems registered by such a party for the purposes of participating in TERRE. Do you agree that this is appropriate terminology (and if not what alternative would you suggest)?
Do you agree with the Workgroup's approach to dividing responsibilities between Supplier and Virtual Lead Party (including in particular the proposal that trading in the wholesale markets and paying Energy Imbalance Charges should remain a Supplier responsibility)?
The Workgroup invites you to give your views using the response form in Attachment B

Virtual BM Units

The P344 Workgroup proposes that customers or aggregators wishing to participate in TERRE (while still relying on a Supplier to take responsibility for imbalance and metering) will register what is termed a Virtual BM Unit to participate in TERRE. From a despatch viewpoint this will be similar to an Additional BM Unit registered by a Supplier (in that it may contain Metering Systems from a portfolio of sites within a GSP Group); but it differs in that Metering Systems are placed in the Virtual BM Unit only for purposes of balancing (not imbalance settlement).

The process for registering a Virtual BM Unit will be similar to the existing CVA BM Unit[6] registration process (as set out in section 3.1 of BSC Procedure (BSCP)15 'BM Unit Registration'), except that some of the data items associated with a conventional BM Unit are not required for a Virtual BM Unit. Further details of the items that are not applicable, or are not required in order to avoid the double counting of energy volumes in Settlement can be found under section 6 of this paper.

Assignment of Metering Systems to Virtual BM Units

The P344 solution will include a new registration process for aggregators and customers to place Metering Systems in Virtual BM Units. The Workgroup proposes that the registration process will be operated by the SVAA.

[5] A 'Trading Party' is a BSC Party who holds Energy Accounts, and is therefore liable for Imbalance Charges. Section A1.4 of the BSC specifies that Energy Accounts are held by Parties responsible for Imports or Exports at a Boundary Point in accordance with Section K; Interconnector Error Administrators; and parties who voluntarily apply to hold Energy Accounts (typically non-physical traders).

[6] Although Virtual BM Units contain SVA Metering Systems, the registration process is similar to that for a CVA BM Unit (rather than a Supplier BM Unit) because Virtual BM Units (like CVA BM Units) will not need to be registered in Market Domain Data (MDD).

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The Workgroup has concluded that aggregators must be able to include Metering Systems supplied by different Suppliers in the same Virtual BM Unit, as the alternative (of only allowing a single Supplier's customers in each Virtual BM Unit) would make it more difficult for customers to change Supplier. In the worst case it could become impossible for the customer to change Supplier without losing the ability to participate in TERRE (e.g. if they no longer met the 1 MW minimum size requirement for a BM Unit to participate in TERRE).

It is proposed that the Supplier will be informed at the stage that a Virtual BM Unit is registered, that its customer has been included in such Virtual BM Unit.

Assessment Consultation Question
Do you agree that the Supplier should be informed that its customer has been included in a Virtual BM Unit at the point that the Virtual BM Unit is registered?
Do you have any particular preference on how the Supplier should receive a communication that its customer has been included in a Virtual BM Unit?
The Workgroup invites you to give your views using the response form in Attachment B

Metered Volumes and Non-Delivery

The Workgroup proposes that Virtual BM Units should be subject to the same Non-Delivery Charges as other BM Units delivering RR. This requires that the Settlement system has access to:

- A FPN, submitted by the aggregator to National Grid (prior to Gate Closure) as a statement of the expected aggregate metered volume for the Virtual BM Unit (in the absence of any instruction from National Grid); and
- A BM Unit Metered Volume, derived by aggregating half hourly meter readings from the Settlement metering at the sites included in the Virtual BM Unit.

In order to derive BM Unit Metered Volumes, the Workgroup proposes that HHDAs should be required to submit half hourly metered data for Metering Systems in Virtual BM Units to the SVAA. The SVAA will then use the half hourly metered data and the registration data to calculate an aggregated BM Unit Metered Volume for each Virtual BM Unit. This is a similar process to the one by which HHDAs submit metered data for Metering Systems in Capacity Market (CM) Units to the Electricity Market Reform (EMR) Settlement process.

In addition to the half hourly Meter readings, the data flow sent from HHDAs to SVAA will need to contain:

- The associated distribution line losses (so that they can be included in the aggregated BM Unit Metered Volumes calculated by SVAA); and
- The Supplier who is responsible for the Metering System (in order to allow SVAA to apply imbalance adjustments to Supplier's Energy Accounts, as described below)

Imbalance Adjustments in relation to Virtual BM Units

The Workgroup believes that Energy Imbalance calculations must be adjusted to allow for acceptances issued to Virtual BM Units, as they would be for acceptances issued to other BM Units. This ensures a level playing field between all providers of RR, as no providers will be receiving additional imbalance payments as a result of delivering RR Acceptances.

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In the case of Virtual BM Units, the adjustment must be made to the Energy Accounts of the Suppliers whose Metering Systems are contained within the Virtual BM Unit (as they are responsible for Energy Imbalance at those sites). In the case where a single Virtual BM Unit contains customers supplied by more than one Supplier, this requires Central Settlement systems to apportion the total energy volume instructed (in TERRE and/or the BM) between them. To allow Settlement systems to do this, it is proposed that aggregators should be required to notify SVAA of the volume instructed to each Metering System. SVAA will then aggregate these volumes to the Supplier level, and pass the results to the SAA for use in Settlement calculations.

Examples intended to illustrate the concept of Supplier imbalance adjustments can be found in Appendix 3.

As illustrated by the examples, the effect of the proposed imbalance adjustments is to take from the Supplier any upwards adjustment of energy (or give to the Supplier any downwards adjustment of energy) that the customer is instructed to deliver. The Workgroup believes that additional cash flows to (or from) the Supplier will be required to account for these, but these should not be specified in the BSC (because the price should be determined by the market, not administered through the BSC arrangements). The Workgroup further believes that these additional payments to/from Suppliers are best implemented in the existing contractual arrangements between Suppliers and customers (i.e. the supply agreement and/or power purchase agreement), rather than expecting Suppliers and aggregators to enter directly into bilateral arrangements.

As illustrated by example 3 (in Appendix 3), applying imbalance adjustments in this way means that the Supplier will be exposed to Imbalance Charges in the event of a customer failing to deliver the instructed volume. The Workgroup proposes that this charge will be levied on the Supplier (as the party responsible for Energy Imbalance at the site). The Workgroup does not propose any BSC mechanism for passing the Imbalance Charge arising from Non-Delivery to the aggregator.

Assessment Consultation Question
Do you agree with the Workgroup's proposed approach to adjusting Suppliers' imbalance positions for the instructed volumes of any acceptances issued to their customers?
Do you agree with the Workgroup that Energy Imbalance Charges arising from Non-Delivery should be charged to the Supplier (like all other Energy Imbalance Charges), rather than the Virtual Lead Party?
The Workgroup invites you to give your views using the response form in Attachment B

Calculation of acceptance volumes and payments

The proposed solution for P344 requires RR Acceptances to be settled in a different way to BM BOAs:

- For BM BOAs, the volume of energy despatched by National Grid (calculated from the Bid-Offer Acceptance) is paid for at the Bid-Offer Price(s) submitted by the GB BSP;
- For RR Acceptances, the 'block' volume of energy accepted by TERRE is paid for at the TERRE GB clearing price. Note that the volume of energy accepted by TERRE will not exactly match the RR Schedule (as TERRE does not take into account the declared Run-up or Run-down rates). Further, Settlement will treat an RR Schedule as having been instructed at the time deadline for BSPs to submit TERRE bids to National Grid. This ensures that volumes relating to the RR Schedule are

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based on deviations from the baseline at that time, rather than a baseline affected by instructions issued after that time.

The overall process of calculating the payments due to GB BSPs can therefore be summarised as follows:

1. Deem an 'undo' Accepted Bid-Offer Volume if required (i.e. if an RR Schedule was created, but no instructions were issued)
2. Calculate the MWh volumes of RR Schedules and energy despatched by National Grid;
3. Assign the correct price to the energy (i.e. the Bid-Offer Price for instructions; the clearing price for 'block' volumes accepted by TERRE; or no price for the run-up and run-down periods within the RR Schedule); and
4. Calculate GB BSP payments

Further details of each of these steps are as follows:

Step 1 – Deem an 'Undo' Accepted Bid-Offer Volume if required

In cases where Settlement has received an RR Acceptance/RR Schedule from National Grid but not a subsequent instruction, Settlement will deem an Accepted Bid-Offer Volume that 'undoes' the RR Schedule (essentially deeming an instruction for the BM Unit to follow the baseline). The volume of this deemed Accepted Bid-Offer Volume will be equal but opposite to the RR Schedule volume and paid (or requiring payment) at the Bid-Offer prices.

Step 2 – Calculate RR Schedule/despatched volumes

Settlement will receive data from National Grid on the RR Acceptance 'block' and the RR Schedule. The process for calculating despatched volumes remain essentially unchanged (except that its scope is extended to include RR Instructions as well as BM BOAs, and Virtual BM Units as well as conventional BM Units). The required steps are as follows:

- Calculate the Acceptance Volume $qA^{k}_{ij}(t)$ for each instruction, in accordance with the existing provisions of BSC section T 'Settlement and Trading Charges' 3.4.
- Calculate the Bid-Offer Upper Range $BOUR^{n}_{ij}(t)$ and Bid-Offer Lower Range $BOLR^{n}_{ij}(t)$, in accordance with the existing provisions of BSC sections T3.4A, T3.4B and T3.5.
- Calculate the Period Accepted Offer Volume QAO^{kn}_{ij} and Period Accepted Bid Volume QAB^{kn}_{ij} for each instruction.
- Calculate the Period Total RR Accepted Offer Volume $RRAO^{kn}_{ij}$ and Period Total RR Accepted Bid Volume $RRAB^{kn}_{ij}$ for each RR Schedule

Step 3 – Assign a price to Energy Volumes

This process can be summarised as follows:

- The volume to be paid at the clearing price is calculated directly from the RR Acceptance (not the RR Instruction). The new acronym Period RR Acceptance Volume ($RRAV_{iJ}$) is proposed for this volume (where the subscript 'J' denotes a quarter hour).

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- The volumes to be paid at each Bid-Offer Price are calculated by summing the QAO^{kn}_{ij} and QAB^{kn}_{ij} values as currently, but the summation only includes BM BOAs (not RR Instructions):

$$QAO^{n}_{ij} = \Sigma^{k}_{(non\text{-}RR)}\ QAO^{kn}_{ij}$$

$$QAB^{n}_{ij} = \Sigma^{k}_{(non\text{-}RR)}\ QAB^{kn}_{ij}$$

- The remainder of the despatched volume is unpriced. This volume is equal to:

$$\text{Unpriced volume} = \Sigma^{k}_{(RR)}\ (QAO^{kn}_{ij} + QAB^{kn}_{ij}) - \Sigma_{J}\ RRAV_{iJ}$$

Where $\Sigma^{k}_{(RR)}$ denotes summation over RR Instructions, and Σ_{J} denotes summation over the quarter hours in a Settlement Period

Step 4 – Calculate payments

The RR Acceptance payment is calculated as the product of $RRAV_{iJ}$ and the clearing price.

Bid-Offer Payments are calculated as currently, as the product of:

- The volume QAO^{n}_{ij} or QAB^{n}_{ij};
- The relevant Offer Price or Bid Price; and
- The Transmission Loss Multiplier (TLM_{ij})

Application of Transmission Losses

Currently in the BSC, a Transmission Loss Multiplier (TLM) is applied in the following calculations:

- Calculating BM Unit Cashflow under the BM (i.e. volume x TLM x price)
- Calculating Non-Delivery Charges under the BM (i.e. volume x TLM x price)
- Calculating Balancing Services Volume before use in the Energy Imbalance Volume calculation

The P344 solution is such that BSPs will be paid (or pay) for RR Acceptances based on the block volume, and the RR Acceptance Cashflow will be subject to TLM adjustment just like BM Unit Cashflow. BSPs will therefore need to account for TLM in their TERRE bid pricing. We recognise that if foreign BSPs are not also required to account for transmission losses, this could grant them a pricing advantage over GB BSPs and therefore harmonisation may be necessary.

The RR Acceptance blocks will feed into the existing Non-Delivery calculation and therefore contribute to the Non-Delivery Charges which will be subject to TLM adjustment.

RR Accepted Offer Volume and RR Accepted Bid Volume will feed into the calculation of Balancing Services Volume per BM Unit (or Virtual BM Unit). This will then have TLM applied when calculating Balancing Services Volume for use in the Energy Imbalance Volume calculation.

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Non-Delivery charges

The P344 solution proposes to apply the existing Non-Delivery Rules to RR Acceptances. RR Acceptance Volumes will feed into the calculation of Period Expected Metered Volume (upon which a Non-Delivery Volume is determined). Further, the Period RR Acceptance Volume ($RRAV_{ij}$) will be included in the stack of Bids (or Offers) to which any Non-Delivery Volume in the half hour is allocated.

In the event that a BM Unit has RR Acceptances in both of the 15-minute periods in a Settlement Period, this approach means that Non-Delivery will be allocated first to the more expensive of the two periods, regardless of when the Non-Delivery physically occurred. This is a consequence of using half hour metering for Settlement, and is consistent with the existing BM process (in which Non-Delivery is allocated first to the most expensive Bid-Offer Band, regardless of whether or not that part of the BOA was physically delivered).

Under the proposed arrangements for non-delivery, the non-delivered volumes would be attributed to the aggregator/customer, whoever is the lead Party under the BSC for the site. However, as these TERRE participants are not Trading Parties, the Supplier will be exposed to the imbalance price.

Assessment Consultation Question
Do you agree with the non-delivery arrangements proposed by the P344 solution in that non-delivered volumes are attributable to the TERRE participant and the Supplier is exposed to the imbalance price?
The Workgroup invites you to give your views using the response form in Attachment B

Imbalance Settlement

Imbalance Pricing

P344 proposes that the calculation of imbalance prices and Net Imbalance Volume (NIV) should include all the physical actions taken on the GB system (by Interconnectors or GB BSPs), but only those taken to meet a GB need should be treated as priced.

The P344 solution also proposes that actions (volumes/prices) are calculated at an aggregate level for each Settlement Period, however individual actions should still be visible on BMRS and have traceability to a given imbalance price.

The physical actions to be taken into account are:

- the sum of RR Schedule volume (i.e. GB BSP dispatch); plus
- the sum of Interconnector volumes for each Interconnector scheduled by TERRE.

Settlement will determine the following actions to be included in the imbalance price calculation:

- Volume of GB need met (as declared by TERRE) will enter the imbalance price calculation as an action with a price matching the TERRE GB clearing price
- Settlement will subtract the Volume of GB need met (as declared by TERRE) from the RR Schedule volume to find a remainder that is deemed to meet a foreign need. This therefore enters the imbalance price calculation as an unpriced action
- Interconnector volumes also enter the imbalance price calculation as an unpriced action

Tables illustrating examples of the P344 Imbalance Pricing interactions can be found in Appendix 4.

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Reporting

The P344 solution that has been devised by the Workgroup suggests that the Supplier will be notified when an aggregator/customer that it is responsible for is despatched. It is proposed that the Supplier shall be made aware of such despatch through Settlement reports.

Assessment Consultation Question
Do you agree that the Supplier should be notified that an aggregator/customer has been despatched through Settlement reports?
The Workgroup invites you to give your views using the response form in Attachment B

NETA flow changes

The current P344 solution proposes no changes to CRA reports, on the basis that there will be no new Data Items required under this Modification. We will add a new possible value 'V' for BM Unit Type for Virtual BM Units and Virtual BM Units will have a BM Unit Id starting with 'V_'.

For Parties that are the Lead Party of Virtual BM Units (e.g. Aggregators, Suppliers) we propose that they will receive new reports, similar to CRA reports, which also include the association of MSIDs within Virtual BM Units. We may also create a report for Suppliers that are the Registered Supplier on a Metering System Identifier (MSID) within a Virtual BM Unit (for which the Lead Party is potentially a different BSC Party).

We currently propose no changes to Energy Contract Volume Allocation Agent (ECVAA) reports, on the basis that there will be no new Data Items required under this Modification. In addition, Aggregators will not be a Trading Party (i.e. not hold Energy Accounts) and therefore ECVAA data will be irrelevant.

We propose to change the NETA SAA-I014 (sub-flow 1) Settlement Report to include new data items relevant to TERRE:

- A new Data Group for the daily GBP<->EUR exchange rate determined by ELEXON prior to that Settlement Day
- A new Data Item for the Daily RR Acceptance Cashflows, to reside within the 'Aggregate Party Day Charges'
- A new Data Item for the Period RR Acceptance Cashflows, to reside within the 'Aggregate Party Period Charges' Data Groups
- A new Data Item for the Total System RR Acceptance Cashflow, to reside within the 'System Period Data' Data Group
- BM Unit Metered Volumes for Virtual BM Units (noting that these volumes also exist in BM Units belonging to the Lead Party). This would use the existing Data Group 'BM Unit Period Data' and Virtual BM Units will be distinguishable from other BM Units by their BM Unit Id 'V_' prefix
- A new Data Group for TERRE bids and prices
- A new Data Group for RR Acceptances (blocks)

This report is BSC Party-specific and would cater to Trading Parties (i.e. Generators and Suppliers) that participate in TERRE.

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For Aggregators, the P344 solution proposes a new SAA-I014 sub-flow is created that contains only data relevant to Aggregators participating in TERRE and the Balancing Mechanism.

For instance, this sub-flow will include:

- The daily GBP<->EUR exchange rate determined by ELEXON prior to that Settlement Day
- Trading Charges relevant to an Aggregator (RR Acceptance Cashflows, BM Unit Cashflows, Non-Delivery Charges)
- System Period Data (e.g. Imbalance prices, NIV, total system cashflows)
- BM Unit Metered Volumes for Virtual BM Units only
- BM data (e.g. FPNs, Bid-Offer Data, BM Acceptance Data)
- TERRE bids and prices
- RR Acceptances (blocks)
- Other TERRE-specific data (e.g. TERRE clearing prices, volume of GB needs met, volumes despatched on Interconnectors)

However, this sub-flow would not include:

- Trading Charges irrelevant to an Aggregator (Energy Imbalance Cashflows, Residual Cashflow Reallocation Cashflow (RCRC))
- Account Period Data (e.g. Credited Energy Volume, Account Bilateral Contract Volume)
- Metered Volume Reallocation Notification (MVRN) data

In addition to sub-flow 1, there is also a sub-flow 2 (known as the 'SO flow' which covers all BSC Parties) which we also will update accordingly.

The P344 Workgroup recommends the provision of an additional reporting format (such as .csv) for aggregators and customers who do not want NETA-format pipe-separated files.

Assessment Consultation Question
Do you agree that TERRE participants should receive reports in an appropriate format such as .csv?
Are there any other specific reports that TERRE participants may wish to receive?
The Workgroup invites you to give your views using the response form in Attachment B

Credit, invoicing and payment default

Credit

P344 will introduce a new type of Trading Charge specific to RR Acceptance Cashflow and also affect the existing Non-Delivery Charge calculation to include RR Acceptances. These changes will feed into the existing Credit calculations, specifically the calculation of AEI which is calculated for Settlement Days that the Interim Information 'II' Settlement Run has been performed. CEI and MEI are calculated prior to 'II' and will not be affected.

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Aggregators will only be subject to BM Cashflow, RR Acceptance Cashflow and Non-Delivery Charges (i.e. not Energy Imbalance Cashflow and RCRC. Further, because they are not Trading Parties, they will not have Energy Contracts. Because CEI and MEI require Energy Contract Volume as a comparator for estimation of Metered Volumes, Settlement will not calculate them and the Aggregator's Energy Indebtedness for these Settlement Days will be zero (until the 'II' run is performed and AEI is calculated).

Invoicing

The P344 Workgroup proposes that the Daily Party RR Cashflow is added as a line item on Trading Charge invoices, alongside the other Trading Charges. Aggregators will also receive Trading Charge invoices; however they are not Trading Parties so this change may require some legal drafting to the BSC. Trading Charge invoices state a single amount payable to (or payable by) the Party which is the sum of all the Trading Charges (some of which may be negative).

The P344 solution proposes to invoice BSPs in accordance with the existing payment Calendar, which aligns with the Settlement Calendar in section 2. These invoices will state a Payment Date of three Working Days after the Invoice Date. For clarity, the current arrangements will result in daily invoices being submitted to TERRE participants under the BSC.

Assessment Consultation Question
Do you foresee any issues relating to daily invoicing as per the current BSC arrangements?
The Workgroup invites you to give your views using the response form in Attachment B

Payment Default

Daily Party RR Cashflow will be included as new Trading Charge under the P344 solution, and hence, mutualisation payments for this will ensure that National Grid is not left out of pocket due to Payment Default.

Contingencies

Black Start

We propose that the existing arrangements for a black start event are extended to cover TERRE, notably that GB participation in TERRE is suspended alongside the BM. Any impacts on other TSOs (and compensation) due to a GB Black Start event will need to be covered under TSO-TSO agreements. We anticipate that any Non-Delivery by other TSOs due to foreign Black Start events will also be covered under these agreements.

Legal text

At this stage, there has been no drafting of the legal text to accompany this first Assessment Procedure Industry Consultation. Legal text will be drafted and included in the second Industry Consultation which will include the lower level detail of how the P344 solution will function in practice.

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4 Impacts & Costs

ELEXON will be submitting the high-level Impact Assessment to its service provider on 22 February 2017, the same time at which this first Industry consultation period begins. Therefore, ELEXON does not currently have an indicative view of neither the central costs, nor the lead times in order to implement the Central systems part of the P344 solution.

The costs to implement the P344 solution will be detailed in the second round of Industry Consultation, following the results of the service provider Impact Assessment.

P344 impacts

The initial view of potential impacts arising from the P344 solution are summarised in the table below:

As per the above, the final impacts on participants and the BSC itself will become clearer for the second round of Industry Consultation, as the solution to P344 will be of a greater granularity.

Impact on BSC Parties and Party Agents	
Party/Party Agent	Potential Impact
BSC Parties	BSC Parties and non-BM Parties will be required to make the corresponding adjustments to their systems and process.
Non-BM Parties	

Impact on Transmission Company
The Transmission Company will be required to make the corresponding adjustments to their systems and process.

Impact on BSCCo
ELEXON will be required to implement this Modification.

Impact on BSC Systems and processes	
BSC System/Process	Potential Impact
BMRS	Changes will be required to implement this Modification.
CRA	
FAA	
SAA	

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Impact on BSC Agent/service provider contractual arrangements	
BSC Agent/service provider contract	Potential Impact
BMRA	BSC Agents will be required to implement this Modification.
CRA	
FAA	
SAA	

Impact on Code	
Code Section	Potential Impact
Section Q	Changes will be required to implement this Modification.
Section T	
Section V	
Section X Annex X-1	
Section X Annex X-2	
Section A	Changes may be required to implement this Modification.
Section D	
Section G	
Section H	
Section K	
Section M	
Section N	
Section U	

Impact on Code Subsidiary Documents	
CSD	Potential Impact
BMRS Service Description (SD)	Changes will be required to implement this Modification.
BMRS User Requirements Specification (URS)	
FAA SD	
FAA URS	
SAA SD	
SAA URS	
BSCP15	Changes may be required to implement this Modification.
BSCP18	
BSCP201	

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Impact on Code Subsidiary Documents	
CSD	Potential Impact
BSCP301	

Impact on Core Industry Documents and other documents	
Document	Potential Impact
Grid Code	The Grid Code is impacted by having to make changes in order to accommodate TERRE as a whole and fit in with the P344 solution that has been devised by the Workgroup.
Transmission Licence	Changes to the C16 statements will be required as a result of Project TERRE. There may be specific impacts as a result of this Modification.

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5 Implementation

Recommended Implementation Date

National Grid is seeking to utilise RR Products for energy balancing in GB from TERRE go-live, which is currently scheduled for Q3/Q4 2018. It therefore hopes that the implementation timescales of P344 will align with this date.

At present, ELEXON cannot confirm the exact system development and testing timescales that will be required to implement the P344 solution. We hope to gain a greater understanding of these timescales from the high level Central Impact Assessment that is taking place with ELEXON's service providers, alongside this first Industry Consultation period.

ELEXON is working to the assumption that, on current timescales from both central European TERRE implementation and from GB TERRE implementation (covering both the BSC and National Grid), it will be possible for GB TERRE to go-live at the same time as central European TERRE.

Greater clarity surrounding the implementation timescales for P344 will be Consulted upon during the second round of Industry Consultation for the P344 solution.

Assessment Consultation Question
Do you agree with the Proposer and Workgroup's recommended Implementation Date?
The Workgroup invites you to give your views using the response form in Attachment B

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6 Workgroup's Discussions

The Workgroup developed the solution to P344 over a period of eight Workgroup meetings during 'stage 2' of the Assessment Procedure. Each meeting focussed on particular topic areas, with the Workgroup's discussions being documented below, with headings referenced to the solution items detailed in section 3 of this Industry Consultation document.

Currency Conversion

The Workgroup considered the currency risks arising under its proposed model whereby currency conversion takes place centrally and BSP settlement is in pounds sterling, this model, which can be summarised as follows:

1. There is a currency risk when a GB BSP is accepted to meet a balancing need in a Eurozone system, because the BSP payments will ultimately be funded by Eurozone TSOs (through the TSO-TSO settlement arrangements introduced by Project TERRE, which are invoiced in euros). The funds received from Eurozone TSOs will not necessarily match the payments made to GB BSPs, dependent on exchange rate movements between the Settlement Day and the point at which payment is made to the GB BSP.
2. Conversely, there is a currency risk when a Eurozone BSP is accepted to meet a GB balancing need, because the BSP payment (in euros) will ultimately be funded by Connection and Use of System Code (CUSC) Parties (through their BSUoS charges, which are invoiced in pounds sterling). The liability to which CUSC Parties are exposed will be affected by movements in the exchange rate in between the Settlement Day (when the liability is acquired) and the day on which BSUoS payments are calculated (approximately one month later).
3. There is a risk that because the exchange rate would be published day-ahead, movements between the sterling and euro could impact GB BSPs via the merit order that the central TERRE system operates in euros.

The Workgroup considered whether settling payments to GB BSPs in euros rather than sterling would mitigate these currency risks, but concluded that it would not:

1. Risk 1 would be switched round, so that an RR Acceptance to a GB BSP introduced currency risk if it was issued to balance the GB system (and hence funded by BSUoS parties);
2. Risk 2 (arising from Eurozone BSPs meeting GB needs) would be unaffected; and
3. GB BSPs would face additional currency risks, as they would be operating in GB (and presumably exposed to costs in sterling), but receiving payments in euro.

The Workgroup therefore concluded the settling in euros would not necessarily reduce the currency risks for National Grid (and could increase them, if the majority of GB Acceptances were taken to balance the GB system); and would increase currency risks for GB BSPs.

Although this is outside the scope of the BSC, the Working Group assumes that costs incurred by National Grid as a result of managing these currency risks will be recovered through BSUoS (in the same way as other costs incurred in the course of balancing the system).

The currency risks described above arise because of the delay between striking the contract (when the TERRE auction clears), and settling the contract (some weeks later, in accordance with the settlement timetable). There are also smaller currency risks that arise

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from the delay between fixing the exchange rate (at the day ahead) and striking the contract. These risks could potentially be mitigated by updating the exchange rate throughout the day (rather than fixing it at the day ahead stage), but the Workgroup does not propose this (as doing so would increase the complexity of the arrangements, and would not address the larger risks that arise from the gap between the auction clearing and settlement taking place).

Assessment Consultation Question
Do you agree with the Workgroup's solution that currency conversion should take place centrally and that BSP payments and Settlement should be in pounds sterling?
Do you agree with the Workgroup's proposal that the exchange rate for each Settlement Day should be fixed at the day ahead stage (and not updated intraday)?
The Workgroup invites you to give your views using the response form in Attachment B

Despatch Principles

Over the course of the development of the solution, the Workgroup held lengthy conversations on how it believed despatch should function under the TERRE arrangements. Most of the despatch-related complexities and difficulties identified by the Workgroup relate to the scenario in which National Grid has already issued a BOA (in the Balancing Mechanism) prior to receiving the RR Acceptance results from TERRE (which we are assuming will be around 35 minutes before the start of the hour). The Workgroup's current solution intends to address these complexities. however Appendix 2 details the issues further.

As the TERRE acceptances are individual 15 minute blocks of energy to be delivered, the Workgroup discussed a scenario whereby a block was accepted above the PN for one period, with the next period accepting a block below the PN. In this case, there would be non-delivery under the proposed arrangements due to the down ramp following the first TERRE block meaning that the second TERRE block of energy could not be delivered as per the TERRE acceptance.

The Proposer noted to the Workgroup that it is possible for the BSP to submit linked bids to ensure that the volumes under TERRE can be delivered by the plant. The Workgroup still had concerns that, whilst linking bids would ensure that all volume are deliverable within a one hour period (between each 15 minute TERRE period), it did not necessarily cover the link between two separate one hour periods. In this case, there could be a risk of non-delivery.

As noted under section 3, the Workgroup devised three key principles that it believes should be part of the solution to P344:

1. Despatch of BM Units within balancing timescales will remain the responsibility of the System Operator, not GB BSPs;
2. RR Acceptances are financially firm; and
3. National Grid can affect an amendment to an RR Instruction by issuing subsequent BM BOAs

Assessment Consultation Question
Do you agree with the Workgroup's three proposed principles relating to despatch?
The Workgroup invites you to give your views using the response form in Attachment B

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Facilitating participation by customers and aggregators

The Workgroup discussed the possibility of outlining the obligations that may be applicable to the aggregators or customers once they have acceded to the BSC and are participating in the TERRE market. ELEXON investigated the feasibility of this but determined that it would not be appropriate to do so, as it is a Party's responsibility to ensure that it meets the obligations in the Code that are relevant to that participation capacity.

Further, the Workgroup discussed the level of charge that should be levied onto the participants under the TERRE arrangements. The Workgroup concluded that the charges and obligations applied to the TERRE participants should be appropriate to the level of participation that they will have under the BSC. The Workgroup extended this to include the rights that the TERRE participants may have under the BSC. Further detail of the costs and rights of the TERRE participants will be included in the second round of Industry Consultation.

The Workgroup discussed whether the relationship and associated communications between the Supplier and the aggregator/customer should be facilitated or mandated under the BSC arrangements. The Workgroup determined that it would be most efficient for the BSC to facilitate the communications between Parties, but that it should not be necessary to mandate such communications.

Assessment Consultation Question
Do you agree with the Workgroup that the relationship and associated communications between the Supplier and the aggregator/customer should be facilitated, but not mandated by the BSC?
Do you believe that the proposed arrangements relating to communications between the supplier and aggregator/customer would act as a barrier to participation in TERRE?
Do you agree that the obligations and BSC charges placed on the aggregator/customer participating in TERRE should be proportionate to the role that the customer/aggregator plays under the BSC?
The Workgroup invites you to give your views using the response form in Attachment B

Virtual BM Units

The Workgroup discussed items that would not be required for the Virtual BM Units and emphasised that energy volumes should not, under any circumstance be double counted in Settlement. For example:

- Generation Capacity (GC) and Demand Capacity (DC) are not required, because the capacity will already be included in a BM Unit registered by the Supplier (and would be double-counted if the Virtual BM Unit declared its own GC/DC);
- Exempt Export Flag is not required, because the provisions for Exempt Export BM Units (such as the ability to choose which Energy Account the BM Unit is assigned to) are not relevant to Virtual BM Units.

In order to avoid double-counting of energy, Virtual BM Units will not be required (or allowed) to participate in those BSC processes that relate to energy imbalance. In particular:

- Parties will not be able to submit MVRNs in relation to Virtual BM Units;
- The SAA will not calculate Credited Energy Volumes (QCE_{iaj}) in relation to Virtual BM Units; and

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- The ECVAA will not calculate Credit Assessment Credited Energy Volume ($CAQCE_{iaj}$) or Metered Credit Assessment Credited Energy Volume ($MAQCE_{iaj}$) in relation to Virtual BM Units.

Assignment of Metering Systems to Virtual BM Units

The Workgroup discussed whether the registrations service should be incorporated into the Supplier Meter Registration Service (SMRS) operated by Licensed Distribution System Operators (LDSOs), but concluded that this would raise significant governance and implementation issues.

In the longer term, and outside the scope of P344, parties may wish to consider whether facilities for aggregator registration should be included in any new central registration solution.

The Workgroup suggested in its discussions that Metering Systems that are geographically separated, but still captured under the same Grid Supply Point (GSP) Group should have the ability to be captured under a single Virtual BM Unit. This is consistent with the current arrangements for Additional BM Units, which were introduced into the BSC specifically to allow Suppliers to bid into the BM with a portfolio of customers within a GSP Group. However, it appears that Suppliers have not in fact used Additional BM Units for this purpose, and that the only Additional BM Units to bid in to the BM (to date) have contained customers at a single site (rather than a portfolio of customers at different sites).

National Grid has noted that it may be technical challenging to facilitate BM participation for geographically distributed sites across multiple GSPs due to constraint boundaries.

Assessment Consultation Question
Do you agree with the Workgroup's view that geographically separate Metering Systems that fall under the same GSP Group should have the ability to be captured under a single Virtual BM Unit?
The Workgroup invites you to give your views using the response form in Attachment B

Metered Volumes and Non-Delivery

The Workgroup acknowledges that predicting output for a Virtual BM Unit comprised of many demand or generation sites may be more difficult than predicting output for a conventional generating unit that is directly controlled by the Lead Party. As a result the errors in the FPNs for Virtual BM Units may be larger than those for conventional generating plant. The Workgroup does not believe this to be a problem, provided that the errors are random (as opposed to a systematic overstatement or understatement of output, which could have the effect of allowing the aggregator to avoid Non Delivery charges).

Credit, invoicing and payment default

Payment Default

The P344 Workgroup discussed the possibility of Settlement processes in EUR and flagged the impact of this on Payment Default as an issue. Should a BSC Party engaged in TERRE (and potentially incurred Trading Charges in EUR) enter Payment Default, Settlement

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would need to convert the EUR amount into GBP for the Default Funding Share mechanism.

The P344 determined that this should not be an issue given that its proposed solution is for Settlement and payments to be in pounds sterling.

Contingencies

TERRE process failures

The P344 Workgroup discussed various points of potential failure in the TERRE process between BSPs, Settlement, TSOs, the central TERRE system and Interconnectors. The table below lists the failure points and the outcome of discussions.

Summary of TERRE failure points and Workgroup discussion	
Failure point	Discussion outcome
Central TERRE system	As part of the central TERRE system design, when the system is unable to balance the needs of a country it will issue a notice to the TSO instructing them to operate their own balancing.
National Grid systems	If National Grid is unable to process RR Acceptances from TERRE, we anticipate National Grid would rely on dispatch under the BM instead. Under the current arrangements, National Grid can submit revisions to BOA data and therefore this could be extended to RR Schedules/instructions.
BSP Non-Delivery	BSP volume Non-Delivery will be handled by Settlement via an adjustment in the existing Non-Delivery calculations and subsequent Trading Charge to the Party. In cases where the BSP has a communication fault, National Grid will not receive an acknowledgement feedback communication and therefore an instruction will not complete. Under TERRE, an RR Acceptance will be financially firm and therefore no acknowledgement of a later instruction would result in a deemed 'undo' instruction by Settlement. This may require separate handling in the interest of fairness.
TSO Non-Delivery	This is out of scope of P344 and should be addressed under the TSO-TSO agreements.
Interconnector	This is out of scope of P344 and should be addressed under the TSO-TSO agreements.

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Summary of TERRE failure points and Workgroup discussion	
Failure point	Discussion outcome
TSO Payment Default	TSO-TSO agreements will cover instances of Payment Default by National Grid to other TSOs, or Payment Default by other TSOs. The P344 Workgroup does not anticipate any mutualisation to cover a failure by National Grid to pay other TSOs, however this is outside the scope of P344. Instances of Payment Default by National Grid to BSPs would be addressed under BSC Debtor provisions in Section N 'Clearing, Invoicing and Payment' of the BSC (which would lead to mutualisation), however as we propose RR Acceptance Cashflow feeds into CSOBM, Payment Default would impact all BSPs (participating in both TERRE and BM). The note that SO Payment Default has never occurred to date and therefore the likelihood of this occurring is very low.

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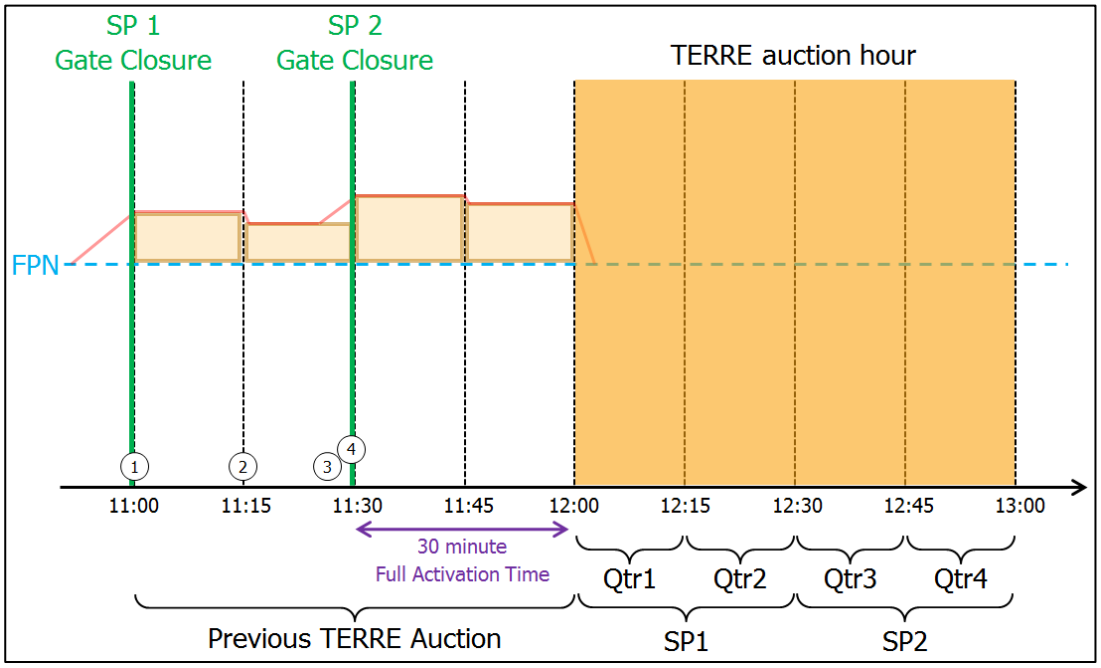
Appendix 1: Summary of project TERRE/Balancing Mechanism interactions

In progressing P344, the Workgroup has needed a working assumption on how Project TERRE will operate. This Appendix outlines this working assumption.

TERRE will operate an hourly auction whereby GB BSPs will bid into the central TERRE system via their TSO (for GB TSO this will be National Grid), at quarter-hour granularity. This means that one auction will cover four quarter-hours, and therefore two Settlement Periods. TERRE bids are referred to as 'upwards' (analogous with BM Offers; offering to increase generation/reduce demand) or 'downwards' (analogous with BM Bids; offering to reduce generation/increase demand). Like the BM, TERRE bids can be positively or negatively priced (e.g. wind farms sometimes submit negatively priced Bids meaning they would be paid to reduce generation to account for lost incentive payments).

We assume that the deadline for BSPs to submit TERRE bids to National Grid will be 60 minutes prior to the start of the hour[7]. National Grid will then have a further 15 minutes to submit these bids and GB need to the central TERRE system. This means that final physical/dynamic data (including FPN) is available for the first Settlement Period but not the second, as Gate Closure for the second Settlement Period would be 15 minutes later (known as the 'beyond the wall' issue). This issue creates risks that participants would be able to change their physical/dynamic data after the results from the central TERRE system have been received. Such changes could cause operational issues (e.g. if MEL was reduced, meaning National Grid cannot construct an instruction that feasibly delivers the RR Acceptance) or allow gaming (e.g. reduction of FPN to artificially create Accepted Offer volume payable to the participant). The P344 Workgroup has discussed these scenarios and has a working assumption that, in the absence of an FPN, BSPs should try to follow their Physical Notification (PN) for the second Settlement period in a given hour. However the workgroup concluded that the 'beyond of the wall' issue should be addressed under the Grid Code.

The diagram below illustrates the timescales for a TERRE Auction Hour starting at 12:00. It also shows the RR Acceptance 'blocks' (in orange) and RR Schedule/instructions (in red) for the previous TERRE Auction Hour starting at 11:00.



[7] In accordance with National Grid's Impact Assessment

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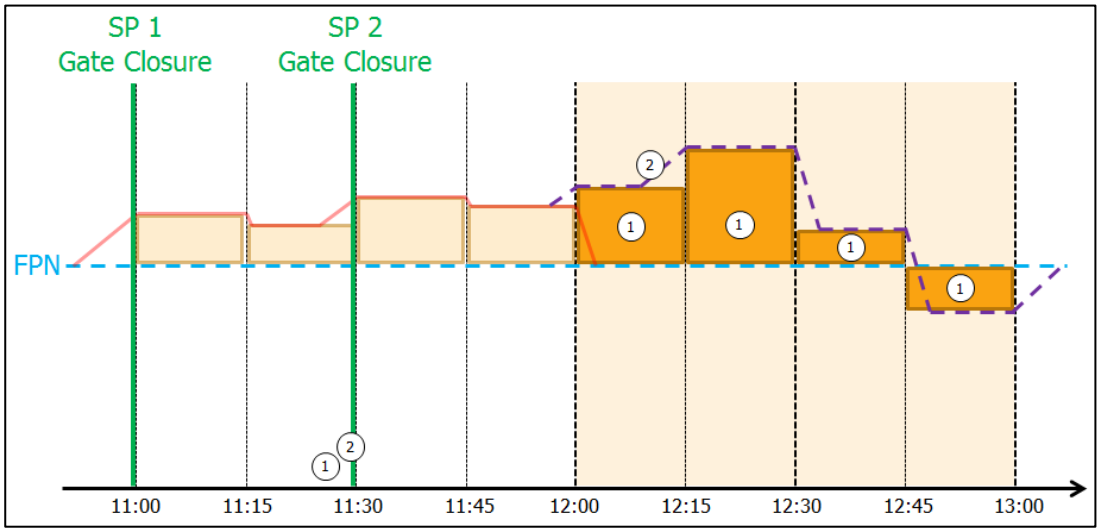
1. Deadline for BSPs to submit TERRE bids to National Grid (11:00)
2. National Grid submits BSP bids and GB need to the central TERRE system (11:15)
3. The Central TERRE system returns RR Acceptance 'blocks' to National Grid (around 11:25)
4. National Grid constructs the RR Schedule and sends this to Settlement (by 11:30)

TSOs have discussed a 30 minute FAT ahead of the hour, meaning that the central TERRE system would have to return results and then TSOs schedule GB BSPs, by this time.

In the diagram below, at 11:25 the central TERRE system returns an RR Acceptance 'block' (in orange) for each of the quarter-hours. We assume that National Grid will immediately construct the RR Schedule (the purple dashed line), adding ramps in accordance with the Physical Data associated to that BM Unit (e.g. how fast it can ramp up/ramp down output). Note that in this example, the MW profile for the previous RR Acceptance sets the baseline from which the new RR Schedule deviates (i.e. the ramp up starting at 11:58). This RR Schedule is then submitted to Settlement and may then be submitted as an instruction to the BM Unit Control Point.



1. The Central TERRE system returns RR Acceptance 'blocks' to National Grid (around 11:25)
2. National Grid constructs the RR Schedule and sends this to Settlement (by 11:30)

Using data from National Grid, Settlement will keep RR Acceptances financially firm by ensuring GB BSPs are paid (or pay) for each RR Acceptance 'block' at the TERRE clearing price for that quarter-hour. Ramps (as per the RR Schedule) are unpaid; however, for the purposes of Settlement, the RR Schedule sets the baseline from which any following instructions are based.

In the diagram below, National Grid has decided to submit an instruction (the red line) to the BM Unit Control Point to follow the RR Schedule. If National Grid does this before 11:30, they cannot instruct beyond 12:30 as we have not yet passed Gate Closure for Settlement Period 2. Therefore National Grid will issue a series of instructions after each Gate Closure, eventually completing the MW profile.

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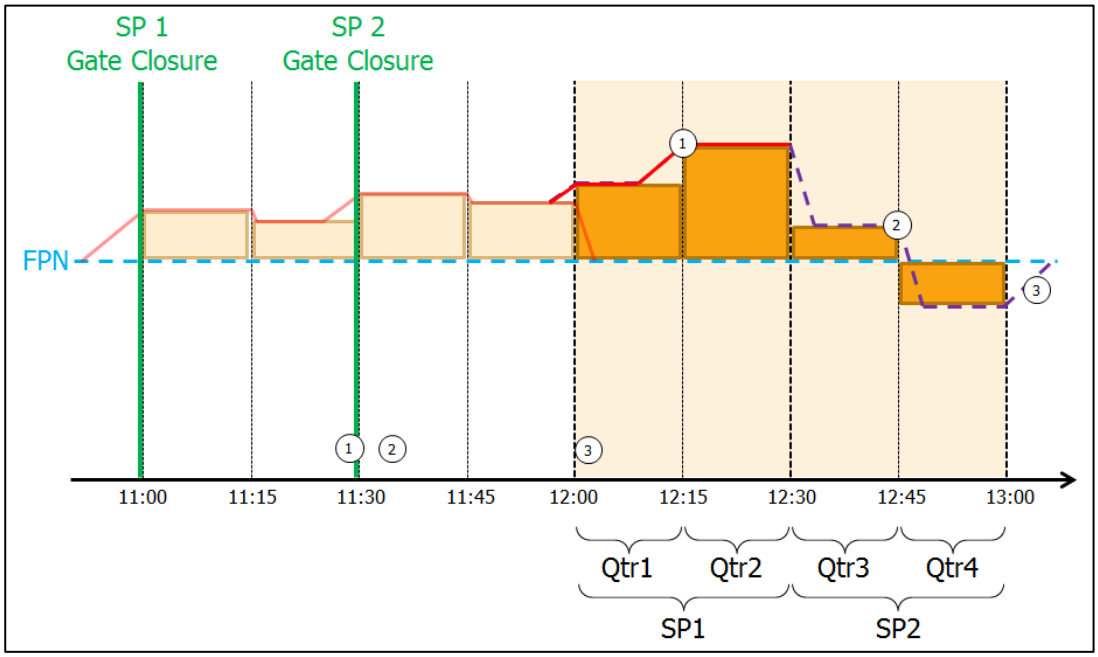
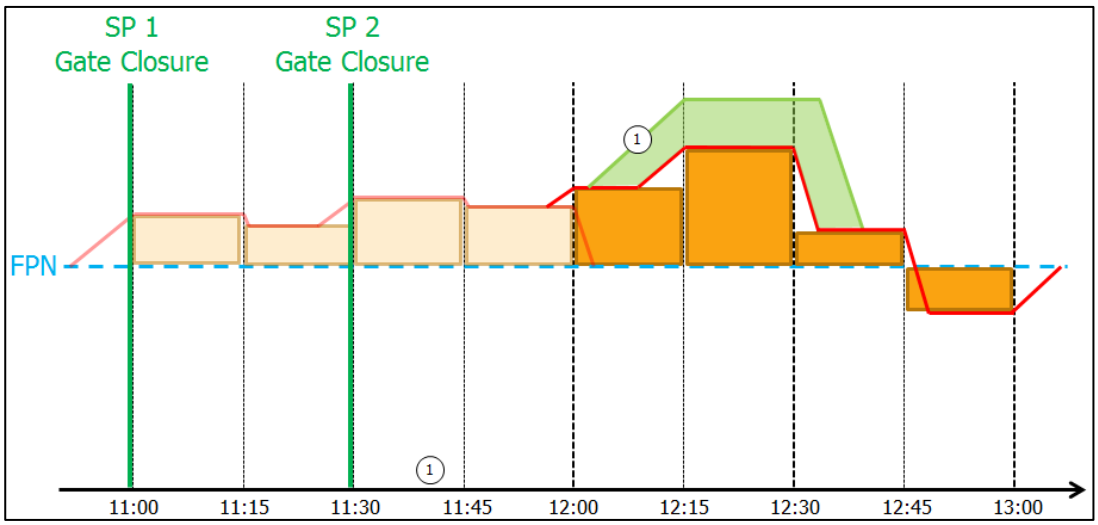


1. Just before 11:30 National Grid issues an instruction to follow the RR Schedule up to 12:30
2. Just after 11:30 National Grid issues an instruction to follow the RR Schedule up to 13:00
3. Just after 12:00 National Grid issues an instruction to follow the RR Schedule after 13:00, completing the MW profile

Under the current arrangements in the BM, BOAs have a Bid-Offer Acceptance Number, allowing Settlement to process BOAs in order whilst following the principle of a baseline being the FPN as modified by previous BOAs. BOAs also have an Acceptance Time and for RR Schedules, we propose that National Grid will set this to be the deadline for BSPs to submit their TERRE bids to National Grid. Settlement will then treat the RR Schedule as issued at that time, essentially overriding the ordering based on Bid-Offer Acceptance Number. This means that RR Schedules will use the baseline that was true at the time of BSP submission, and will not be affected by later instructions. They will also set a new baseline upon which any following instructions deviate (and Bid and Offer Acceptance Volumes are calculated). This addresses issues detailed in Appendix 2.

A typical scenario that has been discussed by the P344 workgroup is where National Grid instructs the BM Unit to change output (i.e. BM BOA), following an RR Instruction. The diagram below illustrates how the RR Instruction interacts with this BM BOA by setting a new baseline from which the BM BOA deviates. This is in line with the existing arrangements under the BM, whereby the baseline is the FPN as modified by previous BOAs.



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1. At 11:40 National Grid instructs the BM Unit to ramp up from 12:04 to an even higher output level at 12:15

Because the RR Instruction sets the new baseline, there is an Accepted Offer Volume (the green shape) between the RR Instruction and the new instruction (the green line) under the BM. This volume is subject to Bid-Offer prices submitted under the BM.

Note that due to the handling of the Acceptance Time of RR Schedules (and instructions), the BM BOA would be treated the same if it were instructed between the time of National Grid submission to the central TERRE system and time that TERRE returned RR Acceptance results.

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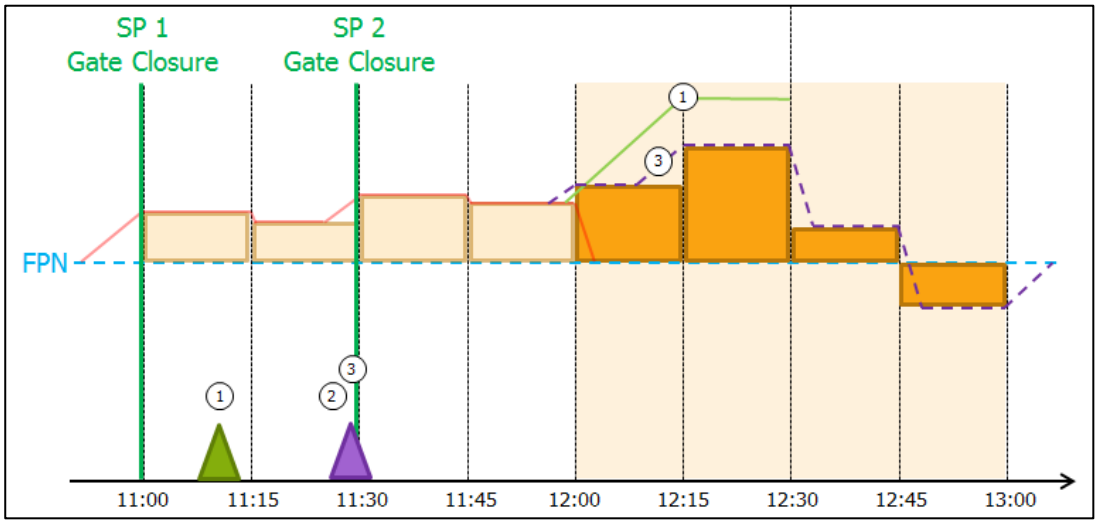
Appendix 2: What happens when a BM BOA is issued before TERRE results?

The P344 Workgroup initially envisaged that under TERRE, National Grid would always issue MW profiles instructing BM Units on the profile they must follow in order to deliver RR Acceptances ('RR BOAs'). However, this approach becomes potentially problematic if National Grid has already issued a BM BOA at the point that the RR Acceptance is received. National Grid has told the Workgroup that they would generally avoid doing this, but that there may be circumstances in which they have to.

The Workgroup later identified that requiring an RR Schedule, which may or may not be accompanied by an instruction, and requiring that such instruction is treated as received before any BM BOAs, would resolve issues in the aforementioned scenario. This Appendix describes how the final solution would work.

In the diagram below, National Grid has submitted the BSP bids and GB need to TERRE and shortly afterwards decided to issue a BM BOA (green line) to the BM Unit as they believe GB need has increased. Because this is before Gate Closure for the second Settlement Period, the BM BOA only goes up to 12:30.



1. At 11:10 National Grid instructs the BM Unit to ramp up from 11:58 to an even higher output level at 12:15. This is before National Grid knows what the results will be from TERRE
2. The Central TERRE system returns RR Acceptance 'blocks' to National Grid (around 11:25)
3. National Grid constructs the RR Schedule and sends this to Settlement (by 11:30)

In the diagram below, National Grid has decided it wants the BM Unit to ramp up slightly to satisfy the RR Acceptance in the first quarter-hour (as per the RR Schedule), then ramp up further from 12:02 to follow the BM BOA. It has therefore issued a RR Instruction (shown as the red line) to this effect, however because this is before Gate Closure for the second Settlement Period, the BOA only goes up to 12:30. National Grid will issue an additional RR Instruction as it passes each Gate Closure, to cover that Settlement Period also.

We have also set the Acceptance Time of the RR Schedule to 11:00 to represent how Settlement will handle it later on.

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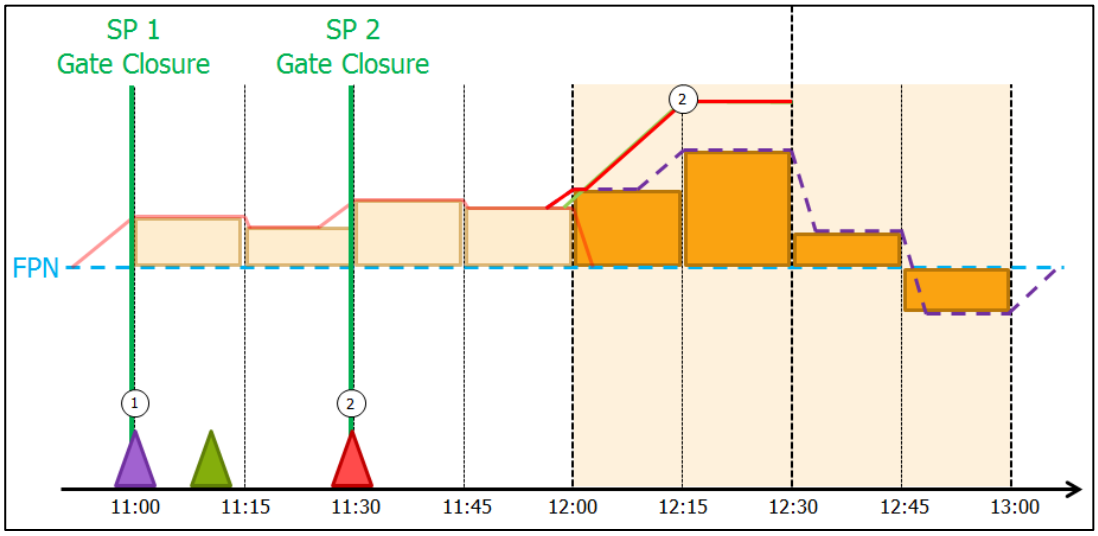
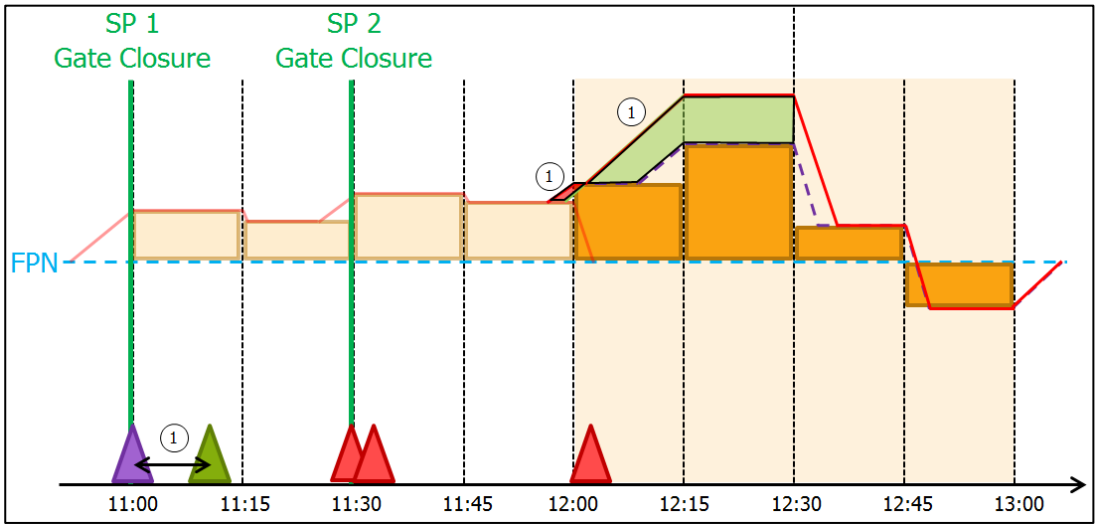


1. Acceptance Time of RR Schedule set to deadline for BSPs to submit TERRE bids to National Grid (11:00)
2. National Grid issues a BOA (RR Instruction) that follows the initial RR Schedule ramp and then the BM BOA

The diagram below shows the final set of RR Instructions (the red line). Settlement must then determine Accepted Bid and Offer Volumes, starting with a comparison of the RR Schedule (purple) and the BM BOA (green). This results in a small Accepted Bid Volume (red area) where the RR Schedule was higher than the BM BOA and a larger Accepted Offer Volume (green area) where the RR Schedule was lower than the BM BOA. These volumes are settled under Bid-Offer prices and payable to/by the Party.



1. Settlement compares the RR Schedule and BM BOA and calculates Accepted Bid and Offer Volumes

Settlement then compares the BM BOA (green) and the RR Instruction (shown in red). This results in a small Offer volume where the RR Instruction was higher than the BM BOA. This volume is settled under Bid-Offer prices and payable to the Party.

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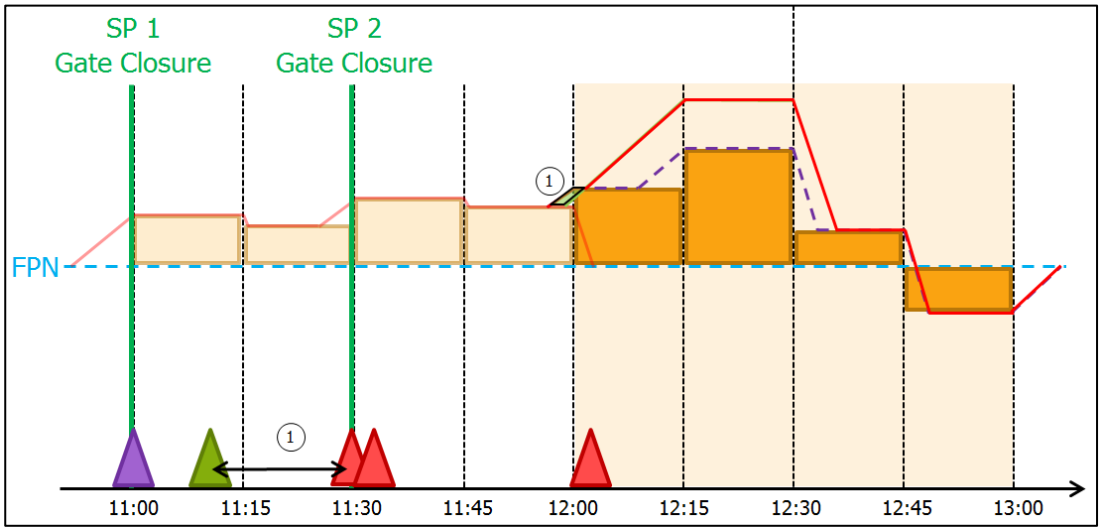
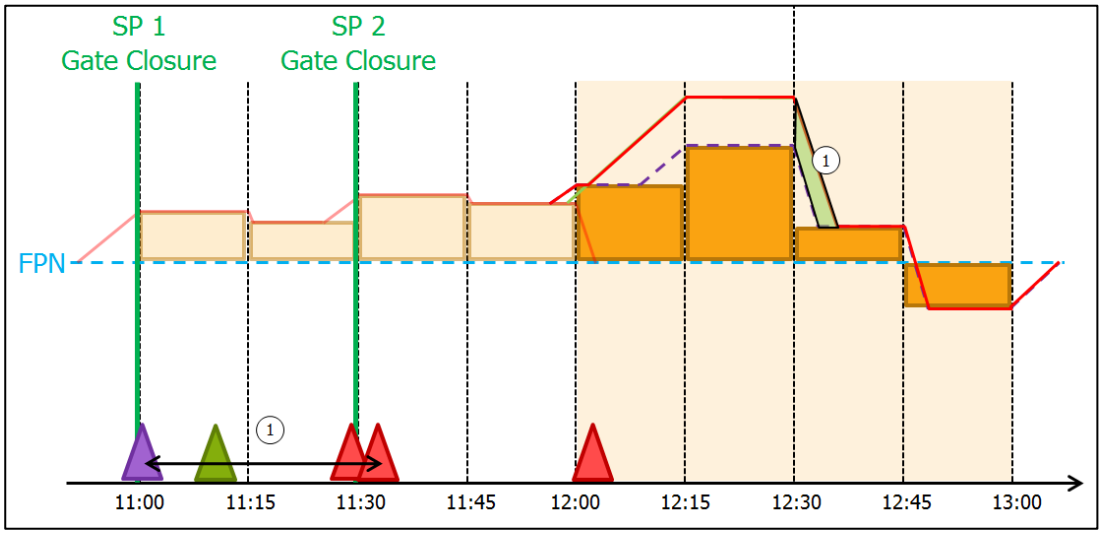


1. Settlement compares the BM BOA and RR Instruction and calculates Accepted Bid and Offer Volumes

In the final diagram below, Settlement has determined Accepted Bid and Offer Volumes for spot times where there was no BM BOA (i.e. the second Settlement Period) comparing the RR Schedule (purple) and the RR Instruction (shown in red). This results in an Offer volume where the RR Instruction was higher than the RR Schedule. This volume is settled under Bid-Offer prices and payable to the Party.



1. Settlement compares the RR Schedule and RR Instruction and calculates Accepted Bid and Offer Volumes

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Appendix 3: Examples intended to illustrate the concept of Supplier imbalance adjustments

Example 1 – A customer instructed to reduce their demand

A customer is capable of reducing their demand when required to do so, and contracts with an aggregator to sell this flexibility into TERRE. The aggregator places the customer into a Virtual BM Unit, which then receives an 8.5 MW Acceptance (for a period of half an hour). The aggregator decides to instruct the customer to deliver 3 MW (with the other 5 MW delivered by other customers in the Virtual BM Unit).

The customer reduces their demand by 3 MW (as instructed), which leaves the Supplier's position 1.5 MWh longer (or less short) than it would otherwise have been. If we did not adjust the Supplier's imbalance position they would be paid for this 1.5 MWh at the imbalance price, which would leave the Supplier and/or customer better off than an equivalent demand side response (DSR) provider in a non-Virtual BM Unit:

- The DSR provider in the non-Virtual BM Unit would have had their imbalance position adjusted, and would therefore still be required to purchase the 1.5 MWh they didn't use (or else be charged for it at the imbalance price);
- The DSR provider in the Virtual BM Unit would not have had their imbalance position adjusted, and would not therefore be required to purchase the 1.5 MWh. If the Supplier had already purchased the 1.5 MWh on their behalf, the Supplier would be compensated for this at the imbalance price.

To avoid this discrepancy, the Workgroup proposes that the Settlement system will apply an imbalance adjustment to the Supplier's Energy Account. This means the Supplier loses the 1.5 MWh they purchased on behalf of the customer (which reflects the fact that the customer has sold the energy on to National Grid). The Workgroup anticipates that a Supplier would in these circumstances require the customer to pay them for the energy (which places the customer in the same position as one in a non-Virtual BM Unit). The price for such payments would need to be determined in the contract between supplier and customer, but to avoid disadvantaging the Supplier it should reflect the forward price at which the Supplier buys energy to meet the customer's demand (i.e. not the imbalance price, and not a retail price inclusive of network charges).

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Example 2 – A customer instructed to increase their demand

Now consider the opposite case, in which a customer is instructed to increase their demand ('demand turn-up'). The customer increases their demand by 1.5 MWh (as instructed by the aggregator), which leaves the Supplier's position 1.5 MWh shorter (or less long) than it would otherwise have been. If we did not adjust the Supplier's imbalance position they would be required to pay for this 1.5 MWh at the imbalance price, which would leave the Supplier and/or customer worse off than an equivalent DSR provider in a non-Virtual BM Unit:

- The DSR provider in the non-Virtual BM Unit would have had their imbalance position adjusted, and would not therefore be required to make any payment for the 1.5 MWh, other than the payment to National Grid to settle the acceptance;
- The DSR provider in the Virtual BM Unit would not have had their imbalance position adjusted, and would therefore be required to purchase the 1.5 MWh. In practice the customer would pay the Supplier for the energy they had used, in addition to the payment they make to National Grid. And the Supplier (assuming they didn't have the foresight to purchase the 1.5 MWh in the market) would have to use this payment to fund an imbalance payment.

To avoid this discrepancy, the Workgroup proposes that the Settlement system will apply an imbalance adjustment to the Supplier's Energy Account. This means the Supplier is credited with the 1.5 MWh that the customer 'bought' from National Grid. The Workgroup anticipates that the Supplier would reflect this in the terms of their supply agreement i.e. the customer should not have to pay the Supplier for the energy cost of the 1.5 MWh they bought from National Grid (although they may have to pay the Supplier for other associated costs e.g. Distribution Use of System charges).

Example 3 – Non-Delivery of an instruction to reduce demand

Suppose that a customer is instructed to reduce demand by 1.5 MWh (as in example 1), but fails to deliver i.e. they do not reduce their demand. The customer will buy the 1.5 MWh from their Supplier (as they would any other energy they have used); but in addition the settlement system will levy Energy Imbalance and Non-Delivery charges in relation to the volume they failed to deliver to National Grid. The Non-Delivery Charge will be levied directly on the aggregator; but the Energy Imbalance charge will be levied on the Supplier. The Workgroup anticipates that Suppliers would seek to pass on the customer the Energy Imbalance charges associated with Non-Delivery of Acceptances by a Virtual BM Unit.

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Appendix 4: Imbalance Pricing and P344 interactions

The following table illustrates a situation where GB BSPs are dispatched to meet both GB need and foreign need:

GB BSP dispatched to meet GB and foreign need		
Physical actions taken to deliver RR Acceptances	Volume of GB need met (as declared by TERRE)	Volumes in price calculation
635 MWh of RR Schedule volume (includes ramps) -305 MWh exported on the Interconnector (includes ramps)	300 MWh	300 MWh, priced at GB TERRE clearing price 335 MWh, unpriced -305 MWh, unpriced

The table below illustrates a situation where GB need is met by both GB BSP dispatch and foreign BSP dispatch:

GB need met by GB and foreign BSPs		
Physical actions taken to deliver RR Acceptances	Volume of GB need met (as declared by TERRE)	Volumes in price calculation
320 MWh of RR Schedule volume (includes ramps) 305 MWh imported on the Interconnector (includes ramps)	600 MWh	600 MWh, priced at GB TERRE clearing price -280 MWh, unpriced 305 MWh, unpriced

These examples only show volumes/prices relating to a single quarter-hour, and as the imbalance price calculation operates per half hour, the calculation would include volumes/prices for both quarter-hours falling within a given half hour. The Workgroup agreed that unpriced actions relating to a given quarter-hour should be netted to minimise the introduction of unpriced actions that would be subject to repricing and could affect the final price.

Where National Grid issues a RR Instruction that doesn't exactly match the RR Schedule, the resulting Accepted Bid or Offer Volumes (and related Bid-Offer prices) will feed into the imbalance price calculation like BOAs do currently under the BM. Where Settlement deems 'undo' Accepted Bid or Offer Volumes, these will also feed into the imbalance price calculation in the same way.

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Appendix 5: Workgroup Details

Workgroup's Terms of Reference

The Workgroup Terms of Reference refer to the points that the Workgroup is required to consider as part of its Assessment of Modification P344. Please note that these points will be further considered by the Workgroup following this first Industry Consultation period.

Specific areas set by the BSC Panel in the P344 Terms of Reference
Extent to which TERRE-related BSC processes should operate in euros
What assumptions need to be made to progress P344?
What will the impact be on Gate Closure
What are the specific Settlement impacts? How will non-BM parties be treated under these rules?
What accession, registration and BSC charges are needed for non-BM parties?
What financial processes are needed (e.g. invoicing, credit and payment rules)? How will non-BM parties be treated under these rules?
What non-delivery rules are needed (e.g. covering volumes and payments)? How will non-BM parties be treated under these rules?
What are the failure scenarios?
What are the reporting requirements?
The consumer impacts from P344

Assessment Procedure timetable

P344 Assessment Timetable	
Event	Date
Present Interim Assessment Procedure to Panel	13 Oct 16
Workgroup Meeting 5	19 Oct 16
Workgroup Meeting 6	31 Oct 16
Workgroup Meeting 7	14 Nov 16
Workgroup Meeting 8	30 Nov 16
Workgroup Meeting 9	14 Dec 16
Workgroup Meeting 10	11 Jan 17
Workgroup Meeting 11	25 Jan 17
Workgroup Meeting 12	8 Feb 17
Assessment Procedure Consultation 1 (15WDs) & Impact Assessment	22 Feb – 14 Mar 17
Workgroup Meeting 13	22 Mar 17
Workgroup Meeting 14	29 Mar 17
Impact Assessment & legal text drafting (15WDs)	6 – 28 Apr 17
Workgroup Meeting 15	10 May 17
Assessment Procedure Consultation 2 (15WDs)	25 May – 15 Jun 17

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P344 Assessment Timetable	
Event	Date
Workgroup Meeting 16	21 Jun 17
Present Assessment Report to Panel	13 Jul 17

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Workgroup membership and attendance

P344 Workgroup Attendance													
Name	Organisation	05 Jul 16	13 Jul 16	15 Aug 16	22 Sep 16	19 Oct 16	31 Oct 16	14 Nov 16	30 Nov 16	14 Dec 16	11 Jan 17	25 Jan 17	8 Feb 17
Members													
Douglas Alexander	ELEXON *(Chair)*	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	✓	✓
David Kemp	ELEXON *(Chair)*	×	×	✓	×	×	×	×	×	×	×	×	×
Elliott Harper	ELEXON *(Lead Analyst)*	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓
Simon Fox-Mella	ELEXON *(Lead Analyst)*	✓	✓	✓	✓	×	×	×	×	×	×	×	×
Francesca Scucces	National Grid (Proposer)	×	✓	✓	✓	✓	×	☎	×	☎	×	×	×
Sophie Tilley	National Grid (Proposer)	✓	✓	✓	✓	×	✓	×	✓	×	✓	✓	✓
Andy Colley	SSE	✓	✓	✓	✓	✓	✓	✓	✓	✓	☎	✓	✓
Tom Edwards	Cornwall Energy	✓	×	×	×	×	☎	×	×	×	×	×	×
Phil Hewitt	EnAppSys Ltd	✓	×	×	✓	✓	✓	×	✓	✓	✓	✓	✓
Liz Johnstone	NRB Interconnectors	×	×	×	×	×	×	×	×	×	×	×	×
Paul Jones	Uniper	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	✓	✓
Martin Mate	EDF	✓	✓	✓	☎	✓	✓	✓	✓	✓	✓	✓	✓
Bill Reed	RWE	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	✓	✓
Simon Reid	Scottish Power	×	×	✓	✓	✓	☎	✓	☎	☎	×	✓	✓
Helen Stack	Centrica	✓	✓	✓	✓	×	×	☎	✓	×	✓	×	×
Attendees													
John Lucas	ELEXON *(Design Authority)*	✓	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

P344 Workgroup Attendance													
Name	Organisation	05 Jul 16	13 Jul 16	15 Aug 16	22 Sep 16	19 Oct 16	31 Oct 16	14 Nov 16	30 Nov 16	14 Dec 16	11 Jan 17	25 Jan 17	8 Feb 17
Elliott Hall	ELEXON *(Design Authority)*	✗	✗	✗	✗	✓	✓	✗	✓	✗	✓	✓	✓
Heather Milne	ELEXON (Design Authority)	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗
Steve Wilkin	ELEXON (European Coordination)	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✓
Tina Wirth	ELEXON (Legal)	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Victoria Riley	ELEXON	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Ed Morris	ELEXON	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗
Sarah Ross	ELEXON	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗
Iain Nicoll	ELEXON	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗
Alex Haffner	National Grid	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Andy Paton	National Grid	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Andrew Craig	National Grid	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Andrew Deeley	National Grid	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Chris Fox	National Grid	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Haarith Dhorat	National Grid	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
John Mansi	National Grid	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Nazar Ivasyuk	National Grid	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	☎	✓
Pradeep Ninan	National Grid	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Richard Woodward	National Grid	✓	✗	✓	✓	✗	✗	✓	✗	✗	✗	✓	✓
Ryan Place	National Grid	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓
Adam Sims	National Grid	✗	✗	✗	✗	✗	✗	☎	✗	✗	✗	✗	✗

P344 Workgroup Attendance													
Name	Organisation	05 Jul 16	13 Jul 16	15 Aug 16	22 Sep 16	19 Oct 16	31 Oct 16	14 Nov 16	30 Nov 16	14 Dec 16	11 Jan 17	25 Jan 17	8 Feb 17
Vicci Walsh	National Grid	×	×	×	×	×	×	☎	×	×	×	×	×
Tim Truscott	National Grid	×	×	×	×	×	×	×	×	×	×	×	✓
Michael Coldwell	National Grid	×	×	×	×	×	✓	✓	×	×	×	×	×
Harvinder Virdi	National Grid	×	×	×	×	×	✓	☎	×	×	×	×	×
Pete Underhill	National Grid	×	×	×	×	×	×	☎	×	×	×	×	×
John Kelly	National Grid	×	×	×	×	×	×	×	×	☎	×	×	×
Julian Dyer	National Grid	×	×	×	×	×	×	×	×	☎	×	×	×
Pavinder Babra	National Grid	×	×	×	×	×	✓	×	×	×	×	×	×
Grendon Thompson	Ofgem	✓	✓	✓	✓	×	×	×	✓	×	✓	✓	✓
Dominic Scott	Ofgem	×	×	×	×	×	×	✓	×	×	×	×	×
Shai Hassid	Ofgem	×	×	×	×	×	×	✓	×	×	×	×	✓
Alan McFadden	SSE	×	×	×	×	×	×	✓	×	×	×	×	×
Tim Ellingham	RWE	×	×	×	×	×	×	×	×	×	×	×	✓
Craig Taylor	Engie	✓	✓	×	☎	×	×	×	×	×	×	×	×
Chris Fisher	Centrica	×	×	×	×	×	×	×	×	×	×	×	✓
Mari Toda	EDF	×	×	×	✓	×	×	×	×	×	×	×	×
Steve Taylor	Quorum Development	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	✓
Anthony Waite	Upside Energy	×	×	×	×	×	×	✓	✓	×	×	×	×
Richard Hardy	KiWi Power	×	×	×	×	×	×	×	✓	×	×	×	✓
Yoav Zingher	KiWi Power	×	×	×	×	×	×	✓	×	×	×	×	×
Andrew Heygate-Browne	Welsh Water	×	×	×	×	×	×	✓	×	×	×	×	×

P344 Workgroup Attendance													
Name	Organisation	05 Jul 16	13 Jul 16	15 Aug 16	22 Sep 16	19 Oct 16	31 Oct 16	14 Nov 16	30 Nov 16	14 Dec 16	11 Jan 17	25 Jan 17	8 Feb 17
Andrew Dodson	City Holdings	×	×	×	×	×	×	✓	×	×	×	×	×
Mark Symes	Green Frog Power	×	×	×	×	×	×	☎	☎	×	×	×	×
Graz Macdonald	Green Frog Power	×	×	×	×	×	×	☎	✓	×	×	×	×
Jonathan Graham	The ADE	×	×	×	×	×	×	✓	×	×	×	×	×
William Caldwell	The ADE	×	×	×	×	×	×	✓	✓	×	×	×	✓
Saskia Barker	Flexitricity	×	×	×	×	×	×	×	×	×	×	×	✓
Philip Pearson	Energy Pool EU	×	×	×	×	×	×	✓	×	×	×	×	×
Matthew Tucker	Welsh Power	×	×	×	×	×	×	✓	×	×	×	×	×
Ryan Goddard	Welsh Power	×	×	×	×	×	×	×	×	×	×	×	✓
Paul Sanders	New Stream Renewables	×	×	×	×	×	×	✓	×	×	×	×	×
Colin Prestwich	Smartest Energy	×	×	×	×	×	×	×	×	×	×	✓	×
Simon White	Smartest Energy	×	×	×	×	×	×	×	×	×	✓	×	✓
Dago Cedillos	Open Eneri	×	×	×	×	×	×	×	×	×	×	×	✓
Hannah Robertson	Origami Energy	×	×	×	×	×	×	×	×	×	×	×	✓
Arthur Probert	Ameresco	×	×	×	×	×	×	×	×	×	×	×	✓
Vandad Hamidi	Dong Energy	×	×	×	×	×	×	×	×	×	×	×	☎
Ian Tanner	UK Power Reserve	×	×	×	×	×	×	×	×	×	×	×	✓
Aditi Tulpule	Nabarro	×	×	×	×	×	×	×	×	×	×	×	✓

Glossary of defined terms

Acronyms used in this document are listed in the table below.

Acronyms	
Acronym	Definition
AEI	Actual Energy Indebtedness
BEIS	Department for Business, Energy & Industrial Strategy
BM	Balancing Mechanism
BMRA	Balancing Mechanism Reporting Agent
BOA	Bid Offer Acceptance
$BOLR^{n}_{ij}(t)$	Bid-Offer Lower Range
$BOUR^{n}_{ij}(t)$	Bid-Offer Upper Range
BSC	Balancing and Settlement Code
BSCCo	Balancing and Settlement Code Company
BSCP	Balancing and Settlement Code Procedure
BSP	Balancing Service Provider
BSUoS	Balancing Services Use of System
$CAQCE_{iaj}$	Credit Assessment Credited Energy Volume
CEI	Credit Assessment Energy Indebtedness
CRA	Central Registration Agent
CM	Capacity Market
CMO	Common Merit Order
CSOBM	System Operator BM Cashflow
CUSC	Connection and Use of System Code
DSR	Demand Side Response
DC	Demand Capacity
EB GL	Electricity Balancing Guideline
EBS	Electricity Balancing System
ECVAA	Energy Contract Volume Allocation Agent
ECVN	Energy Contract Volume Notification
EDL(*)	Electronic Dispatch and Logging
EUR	Euro (currency)
FAA	Funds Administration Agent
FAT	Full Activation Time
FPN	Final Physical Notification
GBP	Great British Pound (currency)

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Acronyms	
Acronym	Definition
GC	Generation Capacity
GCDF	Grid Code Development Forum
GSP	Grid Supply Point
HHDA	Half Hourly Data Aggregator
II	Interim Information Run
LDSO	Licenced Distribution System Operator
$MAQCE_{iaj}$	Metered Credit Assessment Credited Energy Volume
MEI	Metered Energy Indebtedness
MEL	Maximum Export Limit
MSID	Metering System Identifier
MVRN	Metered Volume Reallocation Notification
MW	Megawatt
MWh	Megawatt hour
NETA	New Electricity Trading Arrangements
NIV	Net Imbalance Volume
PN	Physical Notification
qA^{k}_{it}	Point Acceptance Volume
$QABk^{n}_{ij}$	Period Accepted Bid Volume
$QAOk^{n}_{ij}$	Period Accepted Offer Volume
QCE_{iaj}	Credited Energy Volume
R1	First Reconciliation Run
R2	Second Reconciliation Run
R3	Third Reconciliation Run
RCRC	Residual Cashflow Reallocation Cashflow
RF	Final Reconciliation Run
RR	Replacement Reserve
$RRAB^{kn}_{ij}$	Period Total RR Accepted Bid Volume
$RRAO^{kn}_{ij}$	Period Total RR Accepted Offer Volume
$RRAV^{kn}_{ij}$	Period RR Acceptance Volume
SAA	Settlement Administration Agent
SF	Initial Settlement Run
SMRS	Supplier Meter Registration Service
SO	System Operator
STOR	Short Term Operating Reserve
SVAA	Supplier Volume Allocation Agent

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Acronyms	
Acronym	Definition
TERRE	Trans-European Replacement Reserve Exchange
TLM	Transmission Loss Multiplier
TSO	Transmission System Operator
XB	Cross Border

External links

A summary of all hyperlinks used in this document are listed in the table below.

All external documents and URL links listed are correct as of the date of this document.

External Links		
Page(s)	Description	URL
3, 9	BSC Issue 60	https://www.elexon.co.uk/smg-issue/issue-60/
7	BSC Modification P114	https://www.elexon.co.uk/mod-proposal/p114-entitlement-of-licence-exemptable-generators-legs-and-other-non-trading-parties-to-bsc-membership-without-evidence-of-trading/
8	ELEXON Data Flows	https://www.elexon.co.uk/about/other-services/data-flows/
8	BMRS Website	https://www.bmreports.com/bmrs/
8	BSC Modification P295	https://www.elexon.co.uk/mod-proposal/p295/
10	BSC Modification P344	https://www.elexon.co.uk/mod-proposal/p344
16	Grid Code Workgroup 0097	http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/Grid-code/Modifications/GC0097/

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