Issue Report

Issue 60 'Interfaces between the European Balancing Project TERRE and the current GB market arrangements'

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About This Document

This document is the Issue 60 Group's Report to the BSC Panel. ELEXON will table this report at the Panel's meeting on 12 May 2016.

There are three parts to this document:

- This is the main document. It provides details of the Issue Group's discussions and proposed solutions to the highlighted issue and contains details of the Workgroup's membership.
- Attachment A contains ELEXON's strawman presented to the Issue Group.

1 Summary

Background

Issue 60 'Interfaces between the European Balancing Project TERRE and the current GB market arrangements' was raised by National Grid on 8 June 2015.

Project Trans-European Replacement Reserves Exchange (TERRE) is an advance implementation project that forms part of the implementation of the European Network Code on Electricity Balancing (NC EB). TERRE aims to harmonise the Transmission System Operator (TSO) dispatch of Replacement Reserve (RR) across seven TSO areas from Great Britain (GB) to Greece. It will do this by introducing common TERRE Products, which would be akin to products such as Balancing and Settlement Code (BSC) Bid-Offers or Short Term Operating Reserve (STOR) submissions.

National Grid is expected to utilise TERRE Products for energy balancing in GB from TERRE go-live, which is currently scheduled for summer 2017. As all current GB balancing products feed into the BSC calculations of imbalance prices and volumes, the Proposer considers that the relevant TERRE Products 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).

Issue Group

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

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

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

Conclusions

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

National Grid was of the view that the Modification needed to be raised promptly to ensure that BSC Systems would be ready for end to end testing in the autumn of 2017. National Grid aims to raise a Modification in time for the June 2016 Panel.

What is the European Network Code on Electricity Balancing

The Network Code on Electricity Balancing (NC EB) 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.

2 Background

What is Project TERRE?

Project TERRE is an advance implementation project that forms part of the implementation of the NC EB. TERRE aims to harmonise the TSO dispatch of RR across seven TSO areas from GB to Greece. It will do this by introducing common TERRE Products, which would be akin to balancing products such as BSC Bid-Offers or STOR submissions.

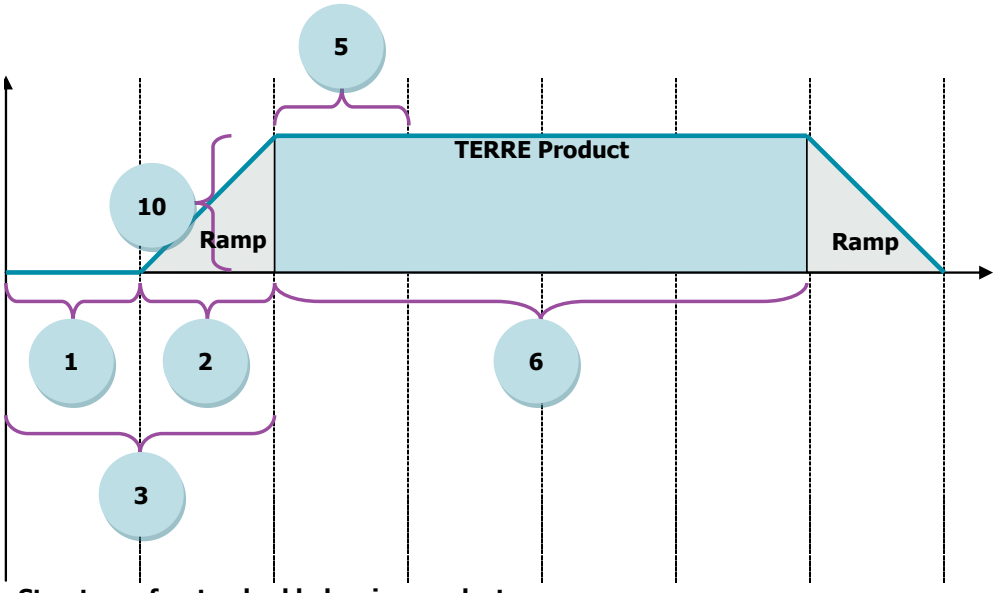
National Grid is expected to utilise TERRE Products for energy balancing in GB from TERRE go-live, which is currently scheduled for summer 2017. As all current GB balancing products feed into the BSC calculations of imbalance prices and volumes, the Proposer considers that the relevant TERRE Products 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 are TERRE Products?

TERRE products must be compliant with TSOs requirements and meet the 12 criterion, which are set out below:

1. Preparation period from 0 to 30 minutes.
2. Ramping period from 0 to 30 minutes.
3. Full activation time (FAT) of 30 minutes.
4. Minimum quantity of 1 MW.
5. Minimum delivery period of 15 minutes or multiples of 15 minutes.
6. Maximum delivery period of 60 minutes.
7. Location in a bidding zone.
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.
10. The maximum bid size will be:
    - in case of divisible offer, no maximum is requested.
    - in case of indivisible offer, the local rules will be implemented.
11. Bid divisibility will be under the responsibility of BSP. The bid volume:
    - Min volume (resolution): 1MW.
    - Resolution after common merit order (CMO): 0.1MW[1].
    - 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[2].

[1] 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.



Structure of a standard balancing product

The expectation is that the structure of a standard TERRE balancing Product will look like the example in the above picture. The numbers correspond to the relevant TERRE Product criteria.

TERRE Settlement

TERRE will settle with a clearing price rather than pay as bid.

Overall GB implementation approach

National Grid has been working in collaboration with the Department for Energy and Climate Change (DECC), Ofgem and ELEXON on determining the GB implementation approach to the NC EB. This group has 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.

The four different implementation options considered were:

1. **Common Standard Market Model**

   All current GB balancing products are replaced with approved European, e.g. TERRE, standard products. This would involve the replacement of the balancing aspects under the GB Balancing Mechanism. This would mean that all products would be shared and activated through European coordinated balancing areas (CoBAs) using common merit order lists (CMOLs).

[2] TSOs are seeking harmonisation of caps and floors.

2. **Common Market and GB Specific Products**

   European standard products are introduced into the GB market, which replace some current GB products where possible. This would mean that the number of GB specific products would be reduced. However, some GB balancing products will be retained in order to meet balancing requirements not met by standard products, e.g. Bid-Offer Acceptances (BOAs) in the GB Balancing Mechanism

3. **GB Specific Market and Standard Products**

   European standard products are introduced into the GB market in addition to GB's current balancing products. The number of GB specific products would remain the same as GB would retain all of its current balancing products but would be required to justify their use over standard products as part of the NC EB reporting.

4. **GB Specific Market and Border Conversion.**

   GB Balancing Mechanism retains all of its current balancing market arrangements and continues to use GB specific products. These products can be packaged up by the TSO into standard products for sharing externally and the TSO has access to standard products being offered by other TSOs.

What is the issue?

National Grid is expected to utilise TERRE Products for energy balancing in GB from TERRE go-live. This is currently scheduled for summer 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).

BSC arrangements

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

- The calculation of imbalance process
- The calculation of Trading Parties' Imbalance Volumes
- The calculation of Trading Parties' Information Imbalance Volumes
- The rules regarding Interconnectors under the BSC
- The timing of Balancing Mechanism Reporting Service (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 TERRE Product Acceptances and

- Non-delivery charges
- Credit calculations.

The Issue Group was required to consider each of these areas and determine how they may impact the current BSC arrangements and what solution(s) could be progressed to implement any necessary changes.

GB implementation approach

The Proposer advised that the analysis and the final consensus suggested that option (2) 'Common Market and GB Specific Products' was the most appropriate approach that is compliant with the NC EB. However, there are clear benefits in ensuring GB starts as close as possible to option (3) 'GB Specific Market and Standard Products'. The assumption is that some superfluous GB specific products will be phased out over a period of time, once the equivalent standard products meets GB balancing needs.

The Issue Group noted that the European platforms and algorithms will become a key part of GB system balancing. This will require new European standard products to be introduced into GB Balancing Mechanism arrangements. This will then allow GB market participants to be able to submit standard products to National Grid. TERRE Products will be multiples of 15 minute blocks of power and scheduled by the algorithm once per hour.

Members of the Issue Group were concerned that option (4) 'GB Specific Market and Border Conversion' had been ruled out as a possible option. They noted that this option would involve National Grid, as the TSO, re-packaging the products already available, e.g. Bids and Offers at the border.

The Proposer of Issue 60 noted that at the workshop on the subject in January 2015, there was little support for option (4) as there is no direct participation. That is, Parties would not know exactly where their products would be going. They also commented that if BOAs had been accepted by The Agency for the Cooperation of Energy Regulators (ACER) as a standard product then it may potentially have made the TERRE design a lot easier.

The Proposer also noted that when National Grid, ELEXON, Ofgem and the DECC were considering the possible implementation options, they had been given legal advice. This advice had highlighted that option (4) would not be compliant with the NC EB legislation.

A member of the Group noted that option (4) is essentially the same process as the industry has now, commenting that this option would be relatively straightforward, feasible and would have the minimum impact on systems when compared to the other options. Another member commented that this option would also be the minimum cost approach, particularly for generators.

Another member commented that the NC EB implementation is not set in stone. This could mean that if the work on EC Market Design changes, then the assumption changes. Therefore, option (4) could be re-visited. Members of the Group agreed that this view should be passed on to the Project TERRE design team.

Settlement of TERRE product acceptances

TERRE product submissions

Members of the group commented that there should be a higher level of transparency for TERRE products. They commented that details of the algorithm should be fully public so that everyone knows how to use the product.

How should parameters e.g. Minimum Non-zero Time be treated in the algorithm?

TERRE Products are multiples of 15 minute blocks of power and scheduled by the algorithm once per hour. The Minimum Non-Zero Time (MNZT) represents the minimum time that a Balancing Mechanism (BM) Unit can operate at a non-zero level as a result of a BOAs. The Issue Group assumed that TERRE Product acceptances are converted to BOAs, because National Grid will need to add ramps to the TERRE block.

The Issue 60 Group meeting at which this question was considered split into three parallel subgroups to consider this question.

Sub Group 1

The Group thought that the MNZT parameter should not be allowed in TERRE. They suggested that there should be different prices for different lengths of time (i.e. there could be up to eight bids an hour depending on the numbers used). They also noted that any deviations in the algorithm should not be allowed as this would be too complicated for it to cope.

A member of the Group also suggested whether linked bids could be offered? National Grid confirmed that these types of question are being considered as part of the Products work package of TERRE.

Sub Group 2

The Group felt that National Grid would need to honour any MNZT, and so would need to extend any TERRE acceptance with a corresponding BOA to meet the MNZT. On the other hand, the risk of not being able to meet any MNZT constraint could be placed as a risk on any participant wishing to bid into TERRE, as they would do so at the risk of not being called upon following their first TERRE acceptance and being left to spill onto the Total System until MNZT has been met and the plant ramped down. TERRE will not consider these parameters, only the volume offered and the price it is offered at, with the assumption the participant will be able to deliver this.

The Group thought that TERRE should ideally consider the dynamic parameters of BM Units, so that values such as MNZT can be accounted for when accepting plant. For example, if a plant had a MNZT of six hours, TERRE could factor that in and ensure the plant was either accepted for a six hour duration or not accepted at all. However, this is unlikely to be able to be factored into TERRE at this stage.

The Group felt that this could then exclude certain players from TERRE, on the grounds they are not flexible enough to meet the 15 minute blocks in which TERRE operates to. It was also noted that the 30 minute ramp-up duration would act as a form of exclusion on some players, as participants could only offer into TERRE what they could ramp up to within 30 minutes. This limits harmonisation.

However, if the plant was already operating between the Stable Export Limit (SEL) and Maximum Export Limit (MEL) then this would not be a problem (e.g. due to it already having traded some of its capacity with another participant and was offering its remaining headroom into TERRE). It was noted that some plant need to be operating at the SEL in order to then be able to ramp up in time to any higher level.

Sub Group 3

The Group thought that the MNZT parameter should not be allowed in TERRE. They also thought this would be up to the BSP to decide whether they wanted to submit a TERRE product.

Should TSOs be able to price their needs?

The central TERRE design proposes that the TSOs will send in their balancing volume needs as input to the central TERRE balancing algorithm, but it also proposes that TSOs should be able to put a price cap or floor on these needs so that the algorithm does not seek to meet them at a price outside this. This is because it is assumed that the TSO has other options than TERRE Replacement Reserves to balance its system that it may know will be cheaper for it, e.g. perhaps for National Grid some cheaper GB balancing services or BM bid-offers.

Note that part of the discussion below makes reference to the fact that the central TERRE design proposes that accepted TERRE Products are paid at a clearing price, not a pay-as-bid system as currently exists in the GB Balancing Mechanism.

Sub Group 1

There was a strong view within the Group that TSOs should not be able to price their needs otherwise it is inefficient as it shows a lack of trust in the auction, algorithm and the market itself. They also noted that TSOs should not be able to restrict the market by applying a cap or it will not function as it should.

The Group suggested that a timescale could be put in place where TSOs are able to price their needs at the beginning but then this is removed and TSOs have to stop pricing their own needs. The Group also suggested that if TSOs are able to price their needs then the algorithm will need to be run twice: once with the TSO prices and one without the TSO prices.

Sub Group 2

There was a fairly clear view amongst the group that TSOs should not price their needs (although this may be tempered should the TSO be able to get energy cheaper internally). It was thought that having TSOs price their needs could cause the algorithm to fail to reach equilibrium across the whole balancing area (i.e. some TSOs' prices were too high compared to the clearing price and so they didn't get their needs met as a result). The Group noted that if TSOs priced their needs, this could simply result in a form of TSO-to-TSO trading, in which case would it just be easier to make such trades more transparent? One concern with this was whether it could lead to a viable generating plant that could have been called upon under the BM at a cheaper price being left out due to other non-BM actions being used first.

Sub Group 3

The Group believed it was acceptable for TSOs to price their needs into TERRE and understood the reasons why this had been proposed. However, this acceptance was again conditional on full public transparency of TSO actions, including their prices.

Should there be caps and floors on TERRE prices as is currently required in some other Member States' Energy Markets?

Sub Group 1

The Group agreed that there should not be caps and floors on TERRE prices as is currently required in some other Member States' Energy Markets. They noted that P305 'Electricity Balancing Significant Code Review Developments', which will be implemented on 5 November 2015, has attempted to make the market more reflective. However, the Group noted that if there are caps and floors in some markets and not others this would cause a distortion although they agreed that other Member States may lose out by having caps and floors. A member of the Group noted that the Value of Lost Load (VoLL), which forms part of the P305 solution, is not intended to be a cap but, given appropriate market arrangements (e.g. smart Meters etc.), could potentially (theoretically at least) begin to be seen as one.

Sub Group 2

The Group agreed that these should be removed from elsewhere rather than added in to TERRE but also noted that not enough is known about the algorithm. For instance, if its intent is to clear then would you want a cap or a floor on this? A member of the group suggested that a cost-benefit analysis on caps and floors in other markets is needed. However, the group thought there could be a reasonable case for caps and floors if there were concerns about liquidity and so whether there could be a liquidity threshold for the application of a cap or a floor.

Sub Group 3

The Group did not have a strong view on caps and floors in other countries. In general, it was felt that this would benefit the GB consumer who would have access to more TERRE products (those outside the caps), so it was a matter for those Member State authorities who had caps.

Gate Closure

What does gate closure actually mean?

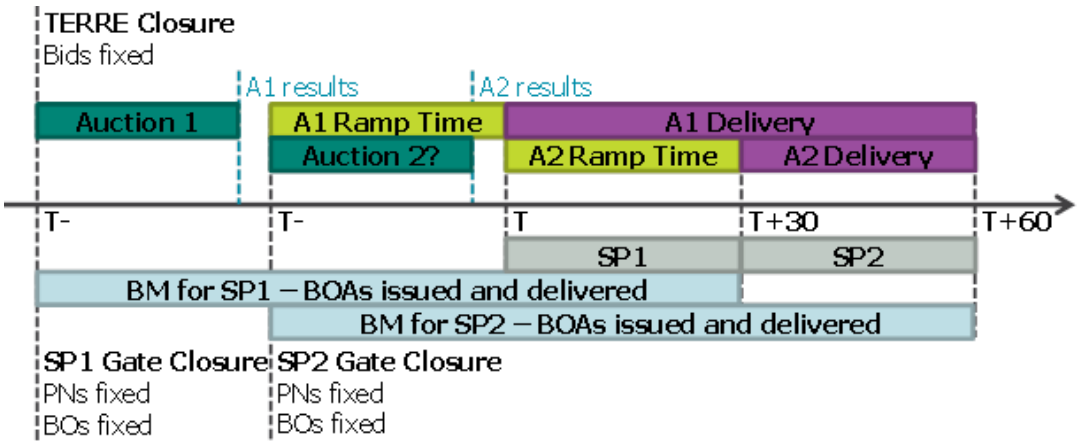
TERRE will have its own Gate Closure by which TERRE Product submissions must be made to the local TSO.

Sub Group 1

The Group noted that the TERRE model aligns with current BSC Gate Closure and so agreed that it should not need to change as a result.

Sub Group 2

The Group noted that at BSC Gate Closure, all Physical Notifications (PNs) are fixed, becoming Final Physical Notifications (FPNs), and Bid-Offer submissions are finalised. Positions can only change through TERRE or the BM.

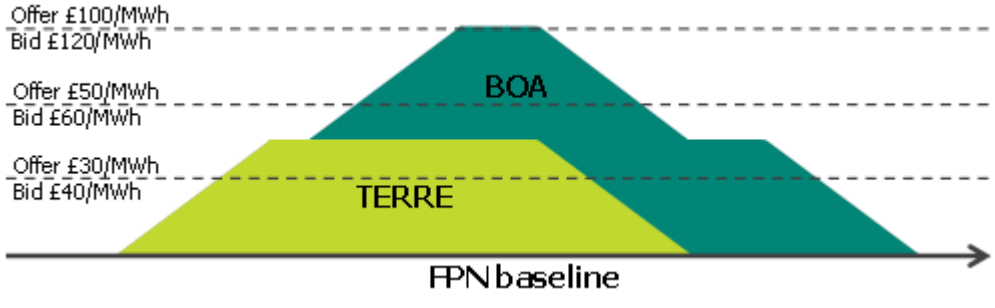


As TERRE was assumed to hold two auctions per hour[3], the Group identified a potential issue with trading for SP2 (Settlement Period 2). The results of Auction 1 are released maybe two or three minutes prior to Gate Closure for SP2. Until this time, the TERRE acceptances are unknown for SP2, creating uncertainty for the participant. This could impact trading strategies for the relevant Parties in the run-up to Gate Closure.

For example, say a Party has bid 100MWh into TERRE. Until it knows if it has been accepted or not, it cannot risk trading this 100MWh on the open market, in case both the trade and the TERRE bid are accepted and the generating plant exceeds its maximum capacity. In effect, the volume bid into TERRE is in limbo until the auction results are released. With only a couple of minutes left before Gate Closure at this point, the Party realistically cannot do anything at this point. Gate Closure for SP2 effectively moves from T-30 (Time-30 minutes) to T-60 (90 minutes ahead of real time) for any TERRE-bid capacity.

The Group noted that Auction 2 (the 'mop-up auction') is not confirmed and may not be included under TERRE. However, TERRE is executed on an hourly basis, with Auction 1 always commencing on the hour (XX:00) at T-60 for the hour starting at T. If Auction 2 takes place then this could create further uncertainty, though by this time the PNs and BOs for SP2 are fixed.

The Group agreed that TERRE acceptances need to be pseudo-BOAs in Grid's algorithms. But where do they get applied in respect to the Bid/Offer price thresholds? Bids and Offers have prices for certain bands, and corresponding prices for undoing them. However, TERRE products won't have a Party-attributed price to their acceptance, but will be set to the TERRE clearing price. However, if Grid needs to accept further BOAs via the BM to add to or undo a TERRE acceptance, they queried how this fits into the price ladders and the construction of BOAs.



[3] Later information obtained during the progression of the Issue suggested that there would be only one auction per hour.

Sub Group 3

The Group thought that Gate Closure was no longer an issue as it noted that TERRE had now moved its Gate Closure proposal to 1 hour (from 50 minutes). As this aligned with GB Gate Closure of 1 hour, there was no longer any need to discuss this further.

Does the current meaning of BSC Gate Closure need to change as a result?

Sub Group 1

The Group had some concerns that if a Party is participating in two balancing markets, whether the TSO is going to wait until TERRE has cleared before instructing other balancing actions. In addition, they had some concerns that they would not know their firm position; the price they would put in might be different to the price at Gate Closure. A member of the group noted that there may be a price impact depending on when they are dispatched.

Sub Group 2

The Group did not consider this issue.

Sub Group 3

The Group gave a lot of thought to whether National Grid would refuse to take BOAs until it had the TERRE results available to it, i.e. that the balancing market would be sterilised. There was a difference of view on this, as to whether National Grid would sterilise like this if there were any chance of a security of supply problem. However, if there was any chance of sterilisation, a member of the Group suggested resolving this by moving Gate Closure to 30 minutes. Other members of the group commented that 30 minutes was too short.

TERRE product publication

Publishing of TERRE bids and offers

The Group considered a number of questions in regard to the publishing the TERRE Products (bids and offers):

- Are the TERRE bids and offers published?
- If so, where are they published?
    - By TERRE central body, locally or both?
    - For GB only products, on BMRS?
- When would it be published?

The Group discussed the most appropriate platform for publishing the TERRE product offers and acceptances. The Group noted European Network of Transmission System

Operators for Electricity (ENTSO-E)'s transparency platform and highlighted that although data would be published on this platform, it would also be beneficial to be published on the BMRS. Members of the Group commented that wherever the data is published, it needs to be on a central working platform, built from the beginning of the project and which is designed by users of the platform. An Issue Group member also suggested that it would be useful if the platform published useful summary statistics e.g. on congestion or what has been dispatched where, as well as more detailed statistics for those who want this degree of detail.

TERRE Product acceptance volumes

Will Parties get sight of bids and offers at the time of the event rather than post-event? If so, where will this be published?

Sub Group 1

The Group agreed that Parties should get sight of bids and offers at the time of the event rather than post-event. They were undecided as to where exactly the data should be published but agreed that it needs to be on a central working platform, built from the beginning of the project and designed by users of the platform. It should also produce data similar to that on the BMRS.

An Issue Group member reiterated that it would be useful if the platform published useful summary statistics e.g. on congestion or what has been dispatched where, as well as more detailed statistics for those who want this degree of detail.

Members of the Group commented that there are issues associated with market power as seeing participants' power and prices is different to seeing a stack that is anonymised. National Grid advised that the TERRE member representing Portugal is looking at post-event information flows so the Issue Group would be able to see the results of this work once they have been finalised.

Sub Group 2

The Group agreed that information from TERRE should be in the same format and locations as now – e.g. the European Transparency Platform and the BMRS. The group believed BOAs are published as they are accepted (real-time), so TERRE acceptances should be published immediately upon their release. Bids into TERRE should also be published in the same manner and to the same timescales as BOs are submitted to Grid under the BM, but the Group wasn't sure if BOs are published at the time of submission or at Gate Closure.

Sub Group 3

The Group was strongly in favour of transparency in general. They agreed a requirement for TERRE offers and acceptances (all, not just GB ones) to be published in 'near real time' on both Electricity Market Fundamental Information Platform (EMFIP) (the ENTSO-E platform) and BMRS. They noted that this would put a requirement on the ENTSO-E platform, which will need to be communicated to them.

Where should the source of data come from? - e.g. direct from TERRE or via BSAD?

Sub Group 1

The Group noted that if the data was via Balancing Services Adjustment Data (BSAD) this would be cheaper than directly from TERRE as there would be a new TERRE net position and price, which would be more expensive. The Group ultimately agreed that the data should be obtained via the following:

TERRE ⟶ National Grid ⟶ ELEXON

Sub Group 2

The Group discussed transparency. It was felt that, for the calculation of the imbalance price, the aggregated volume would be fine as it would all be at the same price. However, it was felt that the relevant information should be published in all the normal places (BMRS, Transparency platform) at the most granular/dis-aggregated level to facilitate maximum transparency. However, they agreed that this is more a question for TERRE/Europe to resolve.

Sub Group 3

The Group agreed that TERRE acceptances should be sent from central TERRE systems to National Grid and National Grid should pass these to BSC systems as part of BSAD, but disaggregated BSAD for transparency and equivalence with other BSAD and BOAs.

If Parties submit bids and offers for TERRE, will this impact their bids and offers in BM?

Sub Group 1

The Group noted that it should impact participants' bids and offers in BM.

Sub Group 2

The Group noted that there is a likelihood that National Grid would wait until the TERRE auction had concluded before issuing BOAs under the BM. At this time, the TERRE acceptances can be added to the FPNs to obtain a clearer picture of the base situation upon which BOAs can be issued to manage any imbalance. However, this would impact on the ramp times for slower BM Units that would need to be dispatched in that first Half Hour (HH) following Gate Closure in order to be effective during the Settlement Period.

The group felt some worked examples of various situations would really help to visualise the situation.

Thoughts on TERRE acceptances and BOAs in combination

The Group made the following assumptions:

- The price ladder will continue to apply to BOAs, but the TERRE clearing price applies to TERRE acceptances.

The Group was issued with a discussion paper on TERRE acceptances and BOAs in combination, extracts of which are shown below. The paper itself was not discussed at a detailed level, but the Group did reach some high-level conclusions:

- TERRE Product acceptances should always have an FPN baseline even if there is a preceding BOA.
- The TERRE Product acceptance will take precedence for settlement purposes, so that effectively a TERRE Product acceptance replaces a BOA and the instructed output/demand is only at the original BOA level if the BOA is at a level outside the TERRE envelope (residual BOA).
- For settlement purposes, it was thought that this would require a disaggregation of the TERRE acceptance/BOA combination into the different volume elements that are paid/pay at different rates, e.g. residual BOA at pay-as-bid; TERRE acceptance at TERRE clearing price; ramping to/from TERRE acceptance separately. However, this was not discussed in detail.

Extracts from the discussion paper and the Group's reactions were as follows.

We divide the timeline into separate sections:

- National Grid wishes to issue a BOA before it has received the TERRE bid submissions from market participants for the same time period.
- National Grid wishes to issue a BOA after it has received the TERRE bid submissions from market participants but before it has forwarded those to the TERRE systems.
- National Grid wishes to issue a BOA after it has passed on the TERRE bid submissions it has received from market participants but before it has received the TERRE acceptances for the same time period.
- National Grid wishes to issue a BOA after it has received and forwarded the TERRE acceptances for the same time period.

Three separate concerns and one question were identified:

- Volumes of combined BOA and TERRE acceptances breaching the MEL or other constraints
- Payments, e.g. non-delivery charges if a combined BOA and TERRE acceptance is not physically achievable
- A specific issue with a BOA and TERRE acceptance combination breaching MZT
- Whether there are any additional issues with BOAs and TERRE acceptances taken in 'opposite directions', e.g. an Offer BOA combined with a TERRE acceptance that would reduce output.

Considering the first two concerns (volumes and prices where they breach a MEL constraint) together:

- **Scenario 1:** National Grid wishes to issue a BOA before it has received the TERRE bid submissions from market participants for the same time period. And National Grid is aware that there could be a TERRE bid from the market participant that if accepted would breach MEL. There are the following options:

- Option 1.1: National Grid issues the BOA to the market participant and requires the market participant to constrain any TERRE bid volume to MEL, in the knowledge of that BOA. This will only work if there is sufficient time to notify the market participant before TERRE Gate Closure. Given that TERRE Gate Closure is likely to be the same as, or closer to real time than the GB Gate Closure for Bid-Offers, this may be possible.

- Option 1.2: National Grid holds from issuing the BOA until the TERRE submission volume is known. And only issues the BOA up to the level that would not breach MEL if the TERRE submission were accepted. This seems overly constraining on National Grid system operation.

- Option 1.3: National Grid holds from issuing the BOA until the TERRE acceptance volume (if any) is known. And only issue the BOA up to the level that would not breach MEL. This is similar to Option 1.2 but even more constraining on system operation.

- Option 1.4: National Grid issues the BOA and if the TERRE acceptance when combined with the already accepted BOA breaches MEL, undertake a post event settlement adjustment.

- In this case, we need to consider whether the party should pay a non-delivery charge; and whether it receives payment for both the BOA and the TERRE acceptance (being firm contracts). Given that National Grid will receive a TERRE payment from central TERRE systems, and that imbalance will be payable, initial thinking is that if this Option is adopted, then the market participant should receive the TERRE payment, be charged the imbalance and the non-delivery charge to ensure it gains no advantage from making a TERRE submission which it knows is not deliverable.

- Current Preference: Option 1.1 as the market participant is aware of the BOA and therefore should not be offering the ability to deliver above MEL in a TERRE submission. Such a restriction would need to be written into the Grid Code. If there is a breach of this condition, consideration should be given to combining this Option 1.1 with Option 1.4.

- **Scenario 2:** National Grid wishes to issue a BOA after it has received the TERRE bid submissions from market participants but before it has forwarded those to the TERRE systems. And National Grid is aware that if the TERRE bid from the market participant is accepted, it would breach MEL. Options:

  - Option 2.1: National Grid amends the TERRE submission volume so that MEL would not be breached if it is accepted. We assume that the TERRE submission is made in MWh, so that the relevant volume of MWh can be shaved off the submission. (It will be much more difficult if the TERRE submission has 'minute by minute' shape – though this is unlikely as it would cause problems in the general case of a non-flat MW FPN baseline, even without any coincident BOAs).

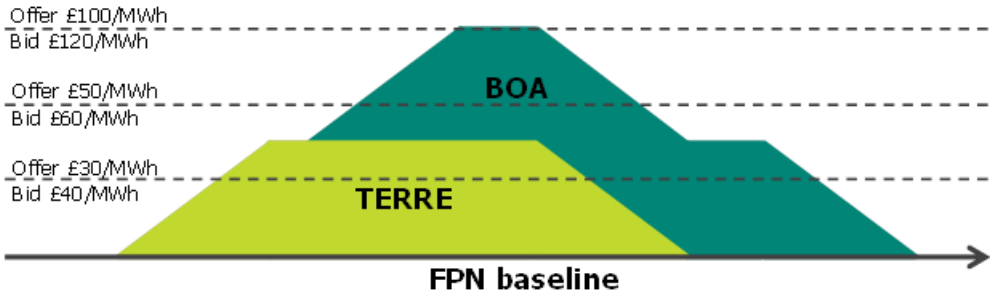
  - It requires sufficient time for National Grid to adjust the TERRE submission before the inter TSO TERRE Gate Closure. This suggests that there could be a degree of uncertainty for market participants as to whether their TERRE submission has been capped or not. However, this no different in principle from the proposal that National Grid marks some TERRE

submissions as not available to TERRE, e.g. if the exacerbate internal GB transmission constraints.

- Option 2.2: National Grid restricts the BOA so that MEL would not be breached if the TERRE submission is accepted. If the TERRE submission is not accepted, then National Grid is free to accept another BOA up to MEL. This is constraining on system operation for the period between the time of first BOA and the TERRE results being available.
- Option 2.3: As in Option 1.4 above, neither the TERRE submission volume nor the BOA are restricted and post-event settlement adjustments are applied.
- In this case the market participant was not aware that the Bid-Offer would be accepted before the TERRE submission, though it was aware of this possibility. Whether this should make any difference to the payments as compared with Option 1.4 is for discussion, but initial thoughts are that it should not.
- Current Preference: If the principle that National Grid is able to amend TERRE submissions is accepted, then Option 2.1 would be appropriate. This Option would not also need to be checked against the legal requirements of the Network Code (The restrictions on unshared bids may suggest that such withholding is not permissible, but this needs to be checked legally if consideration is given to adopting this Option). If the principle that the freedoms open to System Operation can be temporarily restricted is acceptable, then Option 2.2 is appropriate. However, this may result in higher costs overall and therefore need to be considered in the light of Transmission Licence requirements (as now or as amended). Option 2.3 may end up being the only Option that can be adopted in this Scenario.

- **Scenario 3:** National Grid wishes to issue a BOA after it has received the TERRE bid submissions from market participants and after it has forwarded those to the TERRE systems but before it has received the TERRE acceptances from the TERRE systems. And National Grid is aware that if the TERRE bid from the market participant is accepted, it would breach MEL. Options:
  - Option 3.1: This is the same as Option 2.2 above. National Grid restricts the BOA so that MEL would not be breached if the TERRE submission is accepted. If the TERRE submission is not accepted, then National Grid is free to accept another BOA up to MEL. This is constraining on system operation for the period between the time of first BOA and the TERRE results being available.
  - Option 3.2: This is the same as Option 2.3 above, neither the TERRE submission volume nor the BOA are restricted and post-event settlement adjustments are applied.
  - Current Preference: As for Scenario 2, but the first option (2.1) is not available as National Grid can no longer amend the TERRE submissions.
- **Scenario 4:** National Grid wishes to issue a BOA after it has received and forwarded the TERRE acceptances for the same time period.

- This is the standard scenario already discussed and is shown in the diagram below.



- In this case, the TERRE acceptance forms the new baseline for the subsequent BOA. The block TERRE acceptance is paid at the relevant TERRE price and the TERRE ramps treated as agreed (see above). The BOA is paid based on the price ladder, noting that in the above illustrated example this will be at higher prices than if the TERRE acceptance had not preceded it.
- It is assumed that National Grid will not issue a BOA on top of a previous TERRE acceptance that breaches MEL.
- **Scenario 5:** Where a BOA action in the opposite direction to a TERRE action and taken after the TERRE bid has been activated.
    - This appears to be straightforward as it is physically undoing a previously accepted (TERRE) action. The price of the 'undoing' BOA is based on the price ladder.
- **Scenario 6**: BOA taken on a unit that has submitted a TERRE bid while the TERRE bids are being processed by the TERRE algorithm and the TERRE acceptance is subsequently in the opposite direction to the original BOA.
    - This is also straightforward as it is physically undoing a previously accepted (BOA) action. In this case the price of the 'undoing' TERRE action is the clearing price.
- **Scenario 7**: A BOA taken on a BMU that takes the BM Unit to zero MW with a Minimum Zero Time followed by a TERRE acceptance for non-zero MWh that breaches the Minimum Zero Time constraint.
    - It is suggested that this scenario should be avoided where possible. National Grid and the market participant will be aware beforehand of the potential consequences of taking such a BOA. It may be that in this case National Grid should be prevented from accepting such a BOA while this possibility exists, coupled with a justification for such Minimum Zero Time by the market participant? If, however, National Grid does take this action, then we need to examine whether the standard non-delivery charge, TERRE payments and imbalance payments should still be made to/by the market participant are still appropriate.

SO filtering of TERRE products

The Proposer presented an end-to-end example to the Issue Group. Members of the Group were concerned that there would be a filter process carried out by the TSO in deciding which bids and offers are submitted to the TERRE algorithm. They highlighted that this could act as a barrier to competition (e.g. if bids or offers were not submitted to the TERRE algorithm due to local GB constraints). A member queried what the TSO filter process would be. The Proposer commented that this process is currently undecided. It was noted that TSOs are bound by the European rules which are enforced onto them. The Proposer reiterated National Grid's clear preference to involve industry participants as early as possible to help in the decision-making process as a result.

A member of the Group suggested that the TSO could allow all bids and offers to be visible and then the TSO could decide which ones go onto the platform.

The Group considered "What is the TSO filter process before bids and offers go onto the platform?"

Sub Group 1

The Group noted that National Grid will need to take into account internal GB constraints as TERRE is not able to do so. The Group agreed that Parties should not be compensated twice, noting that this is also a general issue not just an issue for TERRE. Members of the Group suggested that the algorithm could be run twice: once constrained and once unconstrained.

Some members of the Group expressed concern about TSOs putting in a particular price as they have a lot more information than market participants. They acknowledged however that TSOs have an incentive to keep costs down.

Sub Group 2

The Group agreed that the TERRE algorithm should cater for internal constraints (currently only caters for Interconnector constraints), otherwise there is a risk that generation in the north of GB for example could trigger internal GB constraints while attempting to deliver over Interconnexion France-Angleterre (IFA) or BritNed (the British-Netherlands Interconnector). (Question: could this impact trades moving across GB, e.g. from France to Ireland?) If this happened, National Grid may then need to take system balancing BOAs to resolve the internal constraint.

The Group's view was that TERRE is a balancing energy market and so it should not filter out players due to physical constraints as this would be unfair to those players. However, should the consumer have to pay when Grid resolves an internal constraint caused by TERRE? The group did consider whether a TERRE acceptance that caused a constraint could be bid back off at the same price, but quickly concluded this would cause more issues than it would solve so disregarded this.

If a TERRE acceptance was backed out, how would this be done while remaining cost-neutral? They noted that there is a risk that the bid-back price could be really high as it was linked to a Bid-Offer that National Grid would never realistically accept under the BM. However, if the plant was accepted under TERRE, there is a risk of gaming if the bid-back price was significantly higher. They suggested that rules could be put in place to stop this.

Another consideration was to split GB into smaller bidding zones based on internal constraints.

The group felt that strong rationale would be needed to close the TERRE market to players, and wondered if gaming would be a strong enough reason.

Sub Group 3

The Group were relaxed with the TSO filter process provided that there was a transparent process.

TERRE Settlement

Preferences

Members of the Group commented that Parties should either be receiving TERRE payment from or making TERRE payments to a central platform, and that any information should feed into the imbalance mechanisms rather than through the Balancing Services Use of System (BSUoS) charge. The Group's preference was for central TERRE Settlement to be via the BSC or the Connection and Use of System Code (CUSC). This is because the governance, rules and provisions are already in place and so this saves having to create an entirely new entity. However, the Group was mindful that ELEXON (as BSCCo) does not have a balance sheet because of its vires.

The Group noted that if costs need to be recovered then these would be picked through BSUoS (in Euros). This is would need to be explored further if this was the Group's preferred option to take forward, due to the risks that would arise from exchange rate fluctuations creating a currency risk for the relevant body.

Without a balance sheet, ELEXON would struggle to take on this risk as it would have nothing to fall back on in the event of a loss. A member of the Group also suggested that there could be a new central entity created across Europe for all Member States to cover this role.

National Grid advised that the NC EB states that the TSO-TSO model is the preferred approach. BSPs will not be interacting with the central TERRE platform directly, but via the TSO/national mechanisms.

Flagging

If TERRE Product acceptances are issued as BOAs, then flags will be needed to distinguish the different elements of the BOA volume that are paid/pay at different rates. For example, 'normal' BOAs, which are settled pay-as-bid must be distinguished from TERRE BOAs, for which the block TERRE acceptance will be settled at a TERRE clearing price. And the associated ramps will be settled separately again (either at zero or pay-as-bid). Flagging is also discussed below.

Non-delivery

- National Grid has an obligation to send required amounts of energy, scheduled by TERRE, across the interconnector

- If the interconnector non-delivery is caused by a non-delivery from a BM Unit should the normal BSC non-delivery rules apply, considering the question of ramps and a TERRE clearing price?

What happens in the instances of non-delivery?

The Group agreed that there should be liability for any failure to deliver a TERRE instruction or for undoing an instruction. They were also in strong agreement that Parties should not be able to gain as a result of non-delivery. Some members of the Group suggested that the existing mechanism for non-delivery of BOAs should be utilised; however they acknowledged that this may not be straightforward as this would be impacted by exchange rates. Essentially, under current arrangements, the price attributed to the BOA (such as the TERRE priced or unpriced action depending on the method adopted) and the imbalance price are compared, and the Party is required to pay the difference as though to convert price of non-delivered volume into imbalance price (although if the imbalance price is lower than the BOA price, the Party would not be paid back the difference to preventing it from profiting in that scenario). This results in the Party being at best neutral on costs, and at worst they pay more as a result of non-delivery.

Other members of the Group suggested that there should be a non-delivery charge. The same calculation as now could be used with the TERRE clearing price being used instead of the BOA price. The Group suggested that it should look into the Grid Code requirements for non-delivery.

What happens in the instances where the scheduled power fails to cross the border?

Sub Group 1

The Group agreed that if the scheduled power fails to cross the border then this would cause an imbalance. National Grid, as the TSO, would then have to step in and find the extra energy to ensure deliverance.

Who is liable for the failure?

Sub Group 1

The Group agreed that the country that failed to provide the power would be held liable. However, they noted that the circumstance for the failure would depend on the nature of the failure. It identified four potential liabilities:

- TSO would be liable if the power fails to flow across its network to the border;
- Interconnector would be liable if the power fails to flow across the border;
- TERRE generator would be liable if it didn't generate the power to cross the border; and
- Domestic (non-TERRE) generator would be liable if they do not generate what they should and this impacted cross-border flows.

Sub Group 3

The Group thought that the underlying cause needed to be identified, e.g. interconnector failure (interconnector liable), transmission failure (TSO liable), generator/supplier failure (industry liable). It would follow the current principles (e.g. via Transmission Network Use of System (TNUoS)).

Effect on Imbalance Prices

Imbalance Volumes

The Group posed the following questions to examine.

- How do we calculate the contracted volume?
    - Is it based on minute by minute FPN and BOAs and TERRE acceptances?
    - Do we need to amend the FPN baseline in the light of TERRE acceptances?
    - Using ramp rates for the FPN but not for the contract volumes? (Note: TERRE acceptances are blocks).
- How do we match TERRE Product Acceptances with BM Units and BSC Party accounts?
    - How do we calculate the Imbalance Volume?
    - Do we just strip out the ramp volumes?
    - Will there be a BOA for the ramp?
- Do we need infinite run up and run down rates in ELEXON's central systems?
- What Acceptances are relevant to GB imbalance volumes?

The Group discussed the high level differences between BM and TERRE. They noted that BM is domestic and activated as it is needed whereas TERRE is European and scheduled.

The Issue Group identified two potential models for calculating the contracted volume.

1. **Use BOAs as we currently do now:**
    A. The Group agreed that the contracted volume should include both the actual product delivery and any ramps either side of this (shown by the red line below). They agreed that TERRE is essentially another kind of BOA so could act as a differently-tagged BOA, and therefore an additional flag for this could be added into the system. They noted that currently there are BOAs for energy balancing and for system balancing purposes. A TERRE BOA could be added to this list. They agreed that it is not logical to have a separate dispatch system for TERRE, so a TERRE flag should be added to the existing GB systems to note a TERRE-related BOA. Members of the Group commented that existing GB mechanisms should be utilised wherever possible.

Original FPN position

B. Members of the Group commented that ramps should not be treated as imbalance for the delivering Party, which means they would need to be treated as contracted volume. They noted that Parties would need to know the ramp profile to be followed, and believed that the same ones would need to be used as those currently registered under the Grid Code.

C. The Group noted that a TERRE BOA would be issued by the System Operator and dispatched. They highlighted that Parties manage BOAs on a minute-by-minute basis and suggested that the same mechanism is used for TERRE. However, it was noted that TERRE uses a central scheduling process which determines which bids should activated.

D. The Group considered whether the FPN baseline would need to be amended to account for TERRE acceptances. Members commented that there could be a step in the process to say what the generator is going to do before the TERRE algorithm. Other members commented that there could be a market rule to say that a Party will be ramped up for TERRE and then ramped down at the end. Overall, the Group agreed that adjustments to Parties' positions could be made as is the case now (i.e. via balancing services such as BOAs) and so the Party's FPN would not need to be amended to account for TERRE acceptances.

E. Members of the Group agreed that, under this approach, TERRE actions should be converted to BOAs and that these should be matched to BM Units. It was believed that all TERRE acceptances for generation sites should be matched up to existing CVA BM Units.

F. The Group noted that demand-side actions will not have an associated BM Unit. These could be registered as 'virtual' BM Units for National Grid's purposes, but would be allocated as Supplier imbalance under the BSC. Suppliers will therefore need to consider this when they contract with the demand-side provider or some way of making imbalance adjustments to suppliers may need to be considered.

The Group overall agreed that this model worked well and would be the easiest for participants to implement as it made use of a lot of existing BSC processes. However, some members noted that this was similar to elements of the 'Option 4' approach that had originally been considered by National Grid. It was highlighted that in order for this approach to differentiate itself from 'option 4' (convert at the border) and hence be deemed legally compliant, market participants should be able to determine the volumes and prices for the TERRE bids, which may differ to those submitted for BOAs.

2. Revised TERRE FPNs:

A. The Group noted an alternative model in which Parties would participate in the TERRE market with the relevant prices and volumes going into the TERRE algorithm. Parties that are accepted would then inform the TSO of what they are going to do and would re-submit their FPNs accordingly to

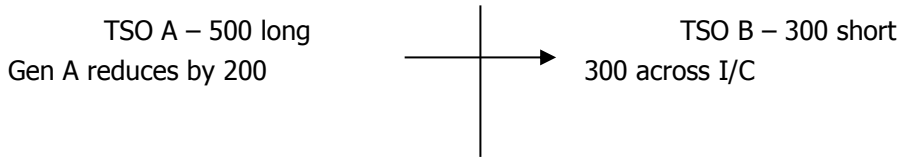
change their profile. The Group noted that the revised FPN would not go into imbalance Settlement except if submitted before Gate Closure (and then only as part of information imbalance and as a baseline for BOAs). Furthermore, if you just changed the FPN without a corresponding Energy Contract Volume Notification (ECVN) being submitted under the BSC, the participant would be put into an imbalance position.

B. The Group noted that this mechanism would not be on a minute by minute basis. The Group also noted that ramp volumes would be included in the amendments to a participant's FPN baseline, and that that there may be infinite run up and run down rates in National Grid's Electricity Balancing System (EBS) which filters through to BSCCo.

C. The Group highlighted that this model would cause IT problems as systems would have to be modified if this mechanism was used. This is because FPN's would need to be amended at Gate Closure. This will affect National Grid's forecast for the Settlement Period, which will affect the BOAs it issues.

Overall the Group agreed that the first model 'use BOAs as we currently do now' was the preference upon which to consider the subsequent areas.

Members of the Group noted that the volume that would be included in imbalance price calculation would be the volume of the TSO's needs that was satisfied – i.e. the total net volume. The total net TERRE volume within the balancing area will never exceed the TSO's stated needs due to the way the TERRE optimisation algorithm works, but could fall short if the TSO had priced its needs too high.



In the example above, TSO A has stated it is 500MWh long and is willing to sell this. The algorithm results in it sending 300MWh across an Interconnector to TSO B, who was 300 MWh short, with Generator A within TSO A's area being paid to reduce its output by 200MWh. This satisfies TSO A's needs. However, under the TERRE optimisation algorithm, TSO A's needs could also be met by, for example, sending 400MWh over the interconnector to TSO B, asking Generator A to reduce output by 300MWh and subsequently receiving 200MWh from a third TSO who is also long. This still nets to resolving TSO A being 500MWh long. Either way, it is this net 500MWh that would be inserted into the imbalance price calculation.

A further example of how the TERRE algorithm may work can be found here: https://prezi.com/sh39zfzbo-ok/.

Ramps

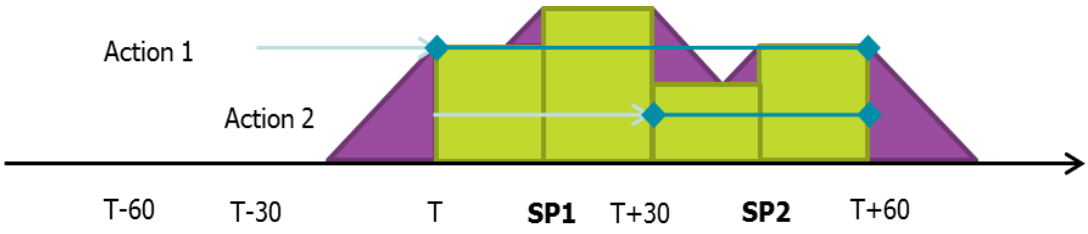
- What happens with ramp up and ramp downs?
    - Is this treated as imbalance or as contracted BOA?
    - And at what price?

Members of the Group suggested that when a TERRE BOA is accepted, the price of the whole profile for the Settlement of the TERRE BOA should be set at zero (i.e. the Party is not paid anything for the BOA itself, as the money would be received via the TERRE mechanism). However, the ramp 'triangles' for each Settlement Period would be treated as imbalance volume if not part of the BOA which would therefore be settled at the relevant imbalance pricing or, if part of the BOA, would be paid zero for the ramps (but not paid imbalance either). The Group suggested that TERRE therefore settles at the marginal price. Members commented that having a different method for paying for the TERRE block sorts out the imbalance position without affecting the physical position. In addition, separating out BSC BOAs and TERRE BOAs helps alleviate the issue of whether TERRE should be settled in Euros (see below).

If using existing mechanisms, the FAA would also pay for the TERRE BOA and reclaim it from National Grid as usual. However, it would need flagging so the appropriate TERRE clearing price was used rather than the pay-as-bid for a 'normal' BOA. The ramps would not be paid.

Additional questions

- How would you cater for two 15 minute prices per Settlement Period? For example, would you take a volume weighted average of the two?
- It was also considered whether Continuous Acceptance Duration Limit (CADL), currently set to 15 minutes, could affect this and result in these actions being CADL-flagged?



It may also be possible for the TERRE Process to be run twice for a given delivery period (i.e. two auctions per GB Settlement Period) with the original auction commencing at T-60 for the whole hour then a second one at T-30 for the second half of the hour. Participants that are dispatched may know the outcome of Auction 1 before Gate Closure for the second half hour (the Settlement Period starting at T+30), as the Auction 1 results will need to be issued by T-30, and Gate Closure for SP starting at T+30 is at T-30. Members asked whether knowing the output of Auction 1 for the second half hour would affect the actions submitted or taken in the second half hour – and could this constitute a form of insider trading? It was suggested that there would definitely be an advantage to knowing this information ahead of bidding into the second auction and so the timings would have to be looked at to mitigate this risk It was also questioned whether there could be a separate price in each of the relevant quarter-hours from each of the two auctions, and if so how would that further impact on the question asked above on there being multiple TERRE prices in a Settlement Period? National Grid commented that if there are two clearing rounds for the same period, then there could be two different clearing prices, particularly if the TSO can input different volumes of needs or the BSPs get the opportunity to change their prices.

TERRE products

Ramps – imbalance or not?

There was much discussion in the Group considering the central TERRE proposal that ramps should be treated as imbalances, because TERRE acceptances (what the TSOs expect to be delivered over the interconnector) were in the form of 15 minute blocks of energy with infinite run-up and run-down rates. The additional ramps that National Grid would need to add to create a feasible BOA were therefore not recompensed by TERRE. There have also been discussions in the central TERRE arrangements between the TERRE TSOs as to whether to have a common approach to ramps, i.e. whether to treat them as imbalances. Conversely, a suggestion was made to the Group that they could be treated as zero-priced contracts, so that although not settled, they would not form part of the imbalance volume either.

Imbalance Prices

The Group noted that Parties can price TERRE bids in two ways: accounting for ramps or not accounting for ramps. However, the assumption it took was that participants in other countries are likely to be accounting for ramps in their TERRE bids, and so it should be assumed the same will apply for GB participants. Members suggested that if the ramps are priced into the product part of the TERRE BOA then the ramp parts of each TERRE BOA should be fed into the imbalance prices as an unpriced action (and possibly SO-flagged). This means it will take the Replacement Price Average Reference (RPAR) price at the end of the calculation. The Group noted that ramping up would mean National Grid would need to account for the ramps when considering whether the system is balanced and what further BOAs need to be issued under the BM, but agreed this was an issue for National Grid to resolve internally.

The Group noted that the cost of the ramp could vary between providers, so could skew overall outcome (e.g. pumped storage will have close to zero ramp time). They highlighted that the less energy delivered ramping, the less needs to be priced into the block and the more competitive their bid. The Group noted that this will be impacted depending on how we adjust the imbalance.

The Group noted that the ramps associated with non-BM Units (e.g. demand-side actions) will not feed into imbalance price calculations but will create Supplier imbalance position.

Members of the Group commented that ramps may be less of an issue if Grid elects to call standard BOAs to bring the BM Unit on earlier or leave it running following delivery of the scheduled TERRE product.

How do we calculate GB Imbalance Prices with TERRE Acceptances?

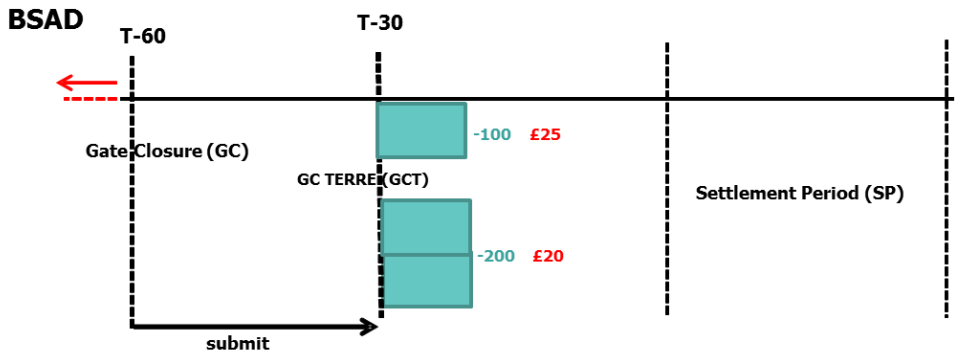
Sub Group 1

The Group overall agreed that only balancing actions taken for GB purposes should be included in the imbalance price stack and that the relevant TERRE balancing actions should be included at the TERRE clearing price. However, they used a working example to demonstrate that there may be potential implications of doing this as detailed below:

GB is 100MW long and France is 100MW long.

The bids/offers go into the algorithm along with the TSO needs with both GB and France being 100MW long. The outcome of the algorithm, based on the prices submitted, is that

GB should schedule its available units (i.e. take bids) to cover both GB and French needs. This means that GB is effectively at -200MW; an extra 100MW of bids are taken in GB (over and above the original GB TSO need) and 100MW is sent over the interconnector from France. . Without TERRE, the -100MW would have been priced at £25 which would have been the single marginal price based on GB bids. However, under TERRE, an extra 100MW has to be scheduled (would could from anywhere in Europe) and the total (-200MW) is at the cleared price of £20. The Party would have to turn down 200MW in GB in order to send the 100MW across the border. NB – the group was in agreement that the imbalance volume for GB should be -100MW and it was just the price that was being considered.



The Group noted that the £20 clearing price will sometimes be better and sometimes be worse for GB participants and that, in any case, there will be some GB participants happy with the situation (e.g. the BSP) and others who are less happy (e.g. parties who are long going into this period). However, it is expected that over the course of a year, this would even out. They also noted that National Grid as the TSO is currently trying to forecast imbalance and putting this on the system earlier. Finally, as the cost going into BSUoS to resolve the GB imbalance of -100MW would be the £20, reflecting this into imbalance might be appropriate.

For the avoidance of doubt, in the case that French generation was reduced rather than additional GB bids being taken, the TERRE cleared price would likely be lower than the £20 and the GB imbalance of -100MW would still be priced at this lower level under the pay-as-clear rules.

A member of the group noted that the TERRE algorithm will have a requirement from the GB TSO and from other TSOs. In effect, the combined GB and other TSO requirement could be considered the 'Euro Net Imbalance Volume (NIV)'. If the GB requirement and the other TSO requirement are in the same direction (e.g. buy reserve or sell reserve) the solution will be priced at the cost of the marginal generator. If this marginal generator is not a GB generator then this generator will set the cleared price. However, they noted that when we look at the "common merit order" it is possible that the GB generators would have set a different marginal price (for example they are cheaper in the stack) and GB generators would have been paid differently (pay as cleared versus pay as bid).

Sub Group 2

The Group agreed that a single TERRE action would be inserted into the relevant price stack for each Quarter Hour (QH) period with a volume equal to the TSO's met needs and a price at the relevant TERRE clearing price for that QH. Separate actions would be

inserted for any TERRE-associated ramps within the Settlement Period and these would be unpriced actions.

Sub Group 3

The Group agreed that only balancing actions taken for GB purposes should be included in the imbalance price stack of balancing actions. They noted that the relevant TERRE balancing actions should be included at the TERRE clearing price. The Group suggested that to ensure that only TERRE actions taken for GB purposes were included, the volume of TERRE acceptances taken should be calculated as follows:

(TERRE acceptance volume taken on GB-located assets) – (TERRE scheduled export volume) + (TERRE scheduled import volume).

Do we need flags for system/energy balancing from TERRE?

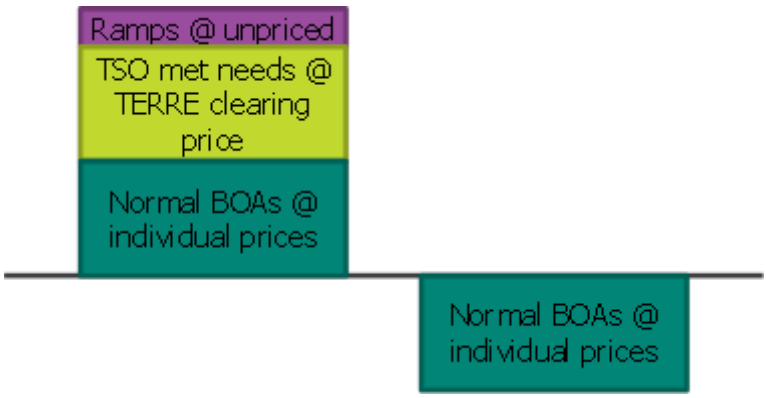
Sub Group 1

The Group noted that we need flags for energy balancing from TERRE not system balancing. They agreed that a TERRE flag would definitely be needed so that the ELEXON systems are able to identify that it is not a normal BOA.

This led to discussion on how to treat ramps in the imbalance calculation. Members of the group suggested that the ramp volumes could be cleared in Manual Frequency Restoration Reserve (mFRR), noting that something may have to be turned off to accommodate this. Another member of the group suggested that the two ramps could be NIV'd off (i.e. there could well be ramps associated with downward/negative block actions that could net off the ramps associated with these upward/positive block actions) However, this is not always guaranteed to happen so treatment of these ramps is definitely important.

Sub Group 2

The Group noted that actions should be for energy balancing purposes and not for system management purposes, so a system/energy balancing flag should not be needed.



Sub Group 3

The Group noted that given that TERRE acceptances are to be included at clearing price in the price stack, then we need a TERRE flag to replace any Bid-Offer price with the TERRE clearing price. Although TERRE is expected to be used for balancing energy only, caution suggests that the systems allow for a system/energy balancing flag. The Group believed that TERRE actions that alleviated GB constraints (by accident) might be flagged as system balancing.

GB/energy balancing vs System balancing or both?

Members of the Issue Group were concerned that having separate TERRE and BM for energy balancing is going to be a complicated process.

Members commented that Parties do not want to miss out on the best trades.

When a TERRE product is activated in GB for regional balancing, does this feed into the GB imbalance price? And is the converse true? (Not activated in GB, so not in GB imbalance price?)

Sub Group 1

The Group agreed that TERRE products should not feed into the GB imbalance price as this should be based on the GB need not where it is activated. They noted that unless a GB imbalance is being met, then this should not feed into the imbalance price.

TERRE produces a clearing price for each unconstrained part of the TERRE area. Given that the interconnectors between GB and other TERRE countries (currently only France) will almost always be fully utilised and so constrained, it is likely that GB will often have its own TERRE clearing price.

Sub Group 2

The Group agreed that if the continent provides / takes energy for GB purposes, this should be included in the price calculation. However, if GB provides / takes energy for the continent, this should not as there was no GB need for this energy. However, by using the TSO met needs volume, only the volume of energy relevant to GB needs will be captured.

The Group considered how this energy may end up in Balancing Services Use of System (BSUoS), which relates to how cost-recovery would work under TERRE. They agreed that it is not a BSC-specific question, but is something that we would need to know.

The Group noted that there will be two volumes per Settlement Period (potentially four if mop-up auctions for the second HH go ahead), each covering a particular QH. The group considered the best approach would be to add each volume in individually at the relevant TERRE clearing price for that QH block. This is consistent with BOA treatment where a plant receives multiple BOAs. It did consider having a single volume-weighted average per HH, but felt this would be less consistent with marginal price theory.

The Group believed that if there was a mop-up auction, then this could 'undo' some of the volume from the original auction. However, these volumes would end up in opposite stacks, so one direction would be NIV-tagged out as the price calculation progresses.

The Group noted that if a BM Unit gets a TERRE acceptance then gets a separate BOA issued via the BM, each would be classed as separate actions in the calculation.

The Group noted that the results from the TERRE algorithm would go to the TSO. It was felt the TSO should then provide the individual instructions to each TERRE provider and also provide the aggregated volumes and associated prices to the relevant BSC Agents for use in the imbalance price calculation.

Money conversion

As imbalance price will be in GB Pounds and TERRE Product acceptances will be in Euros, then there is a need for money conversion rules somewhere in the TERRE-GB processes.

Where should the risk sit (Euros vs Sterling)?

Should Settlement of TERRE be directly settled in Euros? If not where is the conversion rate coming from?

Some members of the Group agreed that the bidding for TERRE would be separate to bidding for BOAs under the BM, so Parties bidding into TERRE should bid in and be paid in Euros for that, but would continue to operate in pounds for existing BOAs submitted into the BM.

Members of the Group suggested that a reference price for any currency conversion could be used. The Group considered whether this should be a daily rate or a half-hourly rate and at what point such a rate should be determined. A member of the Group also suggested that a rate could be determined at TERRE go-live and that rate remains unchanged until subject to a review (e.g. if the Euro/pound change rate dramatically changes in either direction), in a similar manner to the Credit Assessment Price (CAP) used under the BSC credit arrangements.

Members of the Group also considered whether any conversion rate should be fixed at the time of the relevant Settlement Period (real-time) and remain unchanged for all future Settlement Runs for that Settlement Period, or whether each Settlement Run should be calculated using the rate on the calendar day the Run is performed. The Group noted that the latter would create the potential for the imbalance price for a given Settlement Period to change wildly at each Reconciliation Run as the pound/Euro rate changes – especially if the Euro were to crash.

How is the money to be treated within GB?

The Group noted the NC EB requirement that products on common merit order lists are priced in Euros (so this suggests TERRE products should be too). The Group considered whether it should be ELEXON or National Grid or the Party who should take on the exchange risks. They noted that ELEXON could socialise any risks via a Residual Cash flow Reallocation Cash flow (RCRC)-type charge, or National Grid could do all the conversions and feed everything into the BSC in pounds. The Group suggested that some analysis of the different price-conversion scenarios in different case studies is carried out to see which one fits the best. In addition, the Group agreed that it would need to look at how other models works i.e. those that already deal with conversion rates such as:

- The Single Electricity Market Operator (SEMO) (how they handle the pound/Euro conversion between Northern Ireland and the Republic of Ireland);
- National Grid and its existing contracts with France;
- Exchanges; and
- North-Western European Price Coupling (NWE)

Members of the Group agreed that in practice, the risk should sit with those participants who wish to participate in the TERRE market rather than across the market as a whole.

When does TERRE appear in Settlement data?

It is still unknown as to when TERRE will be settled related to the delivery window and whether there would be any reconciliation runs. However, members of the Group commented that they would require TERRE data to be received to the same timescales as Settlement data is now. However, it should be noted that GB cannot force this on TERRE; it is for TERRE TSOs and regulators to negotiate and approve respectively. Some members suggested that existing systems should be utilised where possible e.g. the TERRE data could appear in the SAA-I014 data flow.

The Group agreed that TERRE data should be visible as soon as possible after the calculations, i.e. when the results of the algorithm are published. Some members highlighted that they would want to know what other people are submitting, even though the clearing price may still be unknown at that time. They noted that the output should arise from the calculation to provide dispatch information. However, the Group acknowledged that TERRE still needs to confirm the clarity of information available and when in the process this will be.

4 Conclusions

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

National Grid was of the view that the Modification needed to be raised promptly to ensure that BSC Systems would be ready for end to end testing in the autumn of 2017. National Grid aims to raise a Modification in time for the June 2016 Panel.

Appendix 1: Issue Group Membership

Issue Group membership and attendance

Issue 60 Group Attendance							
Name	Organisation	16 Jul 15	17 Sep 15	15 Oct 15	1 Feb 16	29 Feb 16	9 Mar 16
David Kemp	ELEXON *(Chair)*	✓	✓	✓	✓	✓	✓
Claire Kerr	ELEXON *(Lead Analyst)*	✓	✓	✓	✓	✓	✓
Steve Wilkin	ELEXON *(Design Authority)*	✓	✓	✓	✓	✓	✓
Heather Milne	ELEXON *(Design Authority)*	✓	✓	✓	✓	✓	✓
Tracey Anderson	ELEXON	✗	✗	✗	✓	✗	✗
Alex Haffner	National Grid *(Proposer)*	✓	✓	✓	✗	✗	✗
Francesca Scucces	National Grid (*Proposer Alternate*)	✓	✓	✓	✓	✓	✓
Christopher Fox	National Grid	✓	✓	✗	✓	✓	✓
Laura Jones	National Grid	✓	✗	✗	✗	✗	✗
Sarah Owen	Centrica	✓	✓	✓	✗	✗	✗
Adam Gilham	Ofgem	✓	✓	✓	✓	✗	✓
Grendon Thomas	Ofgem	✗	✗	✗	✗	✗	✗
Tom Edwards	Cornwall Energy	✗	✗	✗	✗	✗	✗
Paul Jones	E.ON	✓	✓	✓	✓	✓	✗
Bill Reed	Npower	✓	✓	✓	✓	✓	✓
Andrew Colley	SSE	✓	✓	✓	✓	✗	✓
Olaf Islei	APX	✗	✗	✗	✗	✗	✗
Mari Toda	EDF Energy	✓	✓	✗	✓	✗	✓
Lee Taylor	GDF Suez	✗	✗	✗	✗	✗	✗
Simon Peter Reid	ScottishPower	✗	✓	✓	✓	✗	✓
Phil Hewitt	Enappsys Ltd	✓	✓	✓	✓	✗	✓
Marta Krajewska	Energy UK	✓	✓	✗	✗	✗	✗
Ian Tanner	UK Power Reserve	✗	✓	✗	✗	✗	✗
Helen Stack	Centrica	✗	✗	✗	✗	✓	✓
Martin Mate	EDF Energy	✗	✗	✓	✓	✓	✓
Nazar Ivasyuk	National Grid	✗	✗	✓	✓	✓	✓
John Mansi	National Grid	✗	✗	✗	✓	✗	✓
Sophie Tilley	National Grid	✗	✗	✗	✗	✓	✓

Appendix 2: Glossary & References

Acronyms

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

Acronyms	
Acronym	Definition
ACER	Agency for the Cooperation of Energy Regulators
BM	Balancing Mechanism
BMRS	Balancing Mechanism Reporting Service *(BSC System)*
BOA	Bid-Offer Acceptance
BSAD	Balancing Services Adjustment Data
BSC	Balancing and Settlement Code *(Industry Code)*
BSCCo	The Balancing and Settlement Code Company *(Code Administrator)*
BSP	Balancing Service Provider
BSUoS	Balancing Services Use of System
CADL	Continuous Acceptance Duration Limit
CAP	Credit Assessment Price
CMO	Common merit order
CMOL	Common merit order lists
CoBA	Coordinated balancing areas
CUSC	Connection and Use of System Code *(Industry Code)*
CVA	Central Volume Allocation
DECC	the Department for Energy and Climate Change
EBS	Electricity Balancing System
EC	The European Commission
ECVN	Energy Contract Volume Notification
EMFIP	Electricity Market Fundamental Information Platform
ENTSO-E	European Network of Transmission System Operators for Electricity
FAT	Full activation time
FPN	Final Physical Notifications
GB	Great Britain
HH	Half Hour
IFA	Interconnexion France-Angleterre *(the GB-France interconnector)*
MEL	Maximum Export Limit
mFRR	Manual Frequency Restoration Reserve
MNZT	Minimum Non-Zero Time
NC EB	European Network Code on Electricity Balancing *(Industry Code)*

Acronyms	
Acronym	Definition
NIV	Net Imbalance Volume
NWE	North-Western European Price Coupling
PN	Physical Notification
QH	Quarter Hour
RCRC	Residual Cash flow Reallocation Cash flow
RPAR	Replacement Price Average Reference
RR	Replacement Reserve
SEL	Stable Export Limit
SEMO	Single Electricity Market Operator
STOR	Short Term Operating Reserve
TERRE	Trans-European Replacement Reserves Exchange
TNUoS	Transmission Network Use of System
TSO	Transmission System Operator
VoLL	Value of Lost Load
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
2	Issue 60 page on the ELEXON website	https://www.elexon.co.uk/smg-issue/issue-60/
10	P305 page on the ELEXON website	https://www.elexon.co.uk/mod-proposal/p305/
24	Example of a TERRE algorithm	https://prezi.com/sh39zfzbo-ok/
31	SEMO's website	http://www.sem-o.com/Pages/default.aspx
31	NEW page on the NordPool's website	http://www.nordpoolspot.com/How-does-it-work/European-Integration/NWE/