nationalgridESO

Cost Benefit Analysis

Changes relating to implementation of modifications GC0068 and P297

January 2019

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Executive Summary

Cost Benefit Analysis

Changes related to implementation of modifications GC0068 and P297

Introduction

This document contains the Electricity System Operator's (ESO's) assessment of the costs and benefits to the end consumer of taking forward changes originally due to be implemented by modification proposals to the Grid Code (GC0068 - Grid Code New and Revised Unit Data and Instructions) and the Balancing and Settlement Code (P297 - Receipt and Publication of New and Revised Dynamic Data Items) associated with EBS delivery. This is based on information provided by some industry participants and our own analysis. We have carried this out to assist Ofgem in their consideration of P373 (Reversal of P297[1]) and have suggested a potential course of action that could be taken following their conclusions.

GC0068 proposed changes in Dynamic Data sets received from Generators plus minor housekeeping changes. P297 proposed to allow the ESO to share the Dynamic Data items introduced in GC0068, and the Last Time to Cancel Sync data item, with Elexon, to be published on the Balancing Mechanism Reporting Service (BMRS). The proposals were intended to work in tandem with P297 allowing the publication of data when received by the ESO. There was no quantitative analysis carried out at the time of the proposals. The marginal cost of implementing the capability was assumed to be zero as it was part of the standard capability of the package being delivered as part of the new Electricity Balancing System. Given that incremental spend is now required to deliver the proposed capability it is important a cost benefit analysis is performed.

The specific Dynamic Data elements in question are as follows:

1. **Profiled Balancing Mechanism Unit (BMU) Stable Import and Stable Export Limits (SIL and SEL).** Under the changes proposed SIL and SEL would be time-varying MW profiles rather than being submitted as single static MW values as it is currently.

2. **Run-Up Rates (Import and Export) and Run-Down Rates (Import and Export).** The changes proposed would allow for a greater number of BMU ramp rates and a change in data resolution to 0.02MW per min

3. **Last Time to Cancel Synchronisation (LTCS)**. This currently exists within the Grid Code but is not passed to Elexon as part of the Dynamic Data set for publication on BMRS.

Stakeholder feedback and benefits identified

We received feedback from only four stakeholders during an open call for evidence from the 6th to the 19th November on these topics. Some feedback identified qualitative benefits to taking forward elements, whilst other feedback expressed concern regarding whether these should be priority changes. The relatively limited response to the consultation might suggest that these changes are not a priority for the industry.

In one of the responses to the call for evidence, some general feedback was received relating to the implementation of P297 and its tie in to the EBS system. We wanted to highlight that we are undertaking a programme of work to deliver better solutions for small units such as our implementation of a web-based submission interface which delivers the original EDL/EDT* intentions[2] raised in GC0068 and we are committed to the delivery of Wider Access, TERRE and the Platform for Ancillary Services (PAS).

In terms of the ESO's own analysis of the benefits of GC0068 and P297, we were able to undertake quantitative analysis on the **Profiled BMU SIL and SEL changes** focusing on the

[1] P373 is currently with the Authority for approval to reverse the original P297 changes
[2] EDL/EDT* are industry interfaces designed to allow data to be sent and received by market participants and the ESO.

benefit of SEL being provided. This showed some benefit to the end consumer which we believe will materialise in future years. We explain this further in Chapter 3.

In terms of **Increased Run-Up and Run-Down rates**, and **Last Time to Cancel Synchronisation** we do not have sufficient quantitative evidence to conclude there are material benefits to the end consumer.

Costs & Risks

We anticipate that the total ESO IT costs to implement the three elements covered by this Cost Benefit Analysis independently from the delivery of EBS would be around £2.5m (£700k for Profiled BMU SIL/SEL, £1.65m for Increased Run-Up and Run-Down rates and £150k for LTCS). This is an estimate and actual costs would be determined once the deliverables were fully specified. In addition, similar changes have in the past incurred business process and change costs of around £250k.

These projects would need to be scheduled along with other changes to the ESO's IT infrastructure including Wider Access to the Balancing Mechanism and Project TERRE. We understand the importance to stakeholders of Wider Access and TERRE and therefore propose to schedule any changes to dynamic data items, as per GC0068 and P297, following their conclusion. Our current expectation is that this would result in delivery in November 2020.

We understand from the feedback we have received that not all parties would consider the changes within GC0068/P297 to be of the highest priority for the ESO. As with all of our change programmes we want to pursue those that have demonstrated benefits for the consumer. This has informed our thinking on the discrete elements within GC0068 and P297.

We do not have any other costs from stakeholders to present as part of this CBA. Elexon have identified that they would need to undertake their own Impact Assessment as part of any subsequent modification, and we anticipate that there could also be wider industry costs to implementing the changes. However, we recognise that these may not be over and above the costs that industry parties had already expected to incur.

Conclusion and next steps

We have concluded that there is a benefit to taking forward work to implement the **Profiled BMU SIL and SEL changes** through the ESO's existing systems and architecture. Any consumer savings are likely to be variable depending upon future market circumstances but we consider they are worth pursuing at this time.

In terms of GC0068 we will consult the Grid Code Review Panel on how best to take Profiled BMU SIL and SEL changes forward. From a BSC perspective, if P373 is approved by Ofgem, we will raise changes in 2019 to include the pass through of these data flows to Elexon for publication on BMRS following the conclusion of the Grid Code process.

With regards to **Run-Up Rates (Import and Export), Run-Down Rates (Import and Export) and Last Time to Cancel Sync** we do not believe that we have identified or been presented with sufficient evidence of consumer benefit at this point in time to recommend that changes are taken forward. We therefore do not plan to take these elements forward but would be open to further dialogue if stakeholders identify new evidence of consumer benefits.

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Introduction

GC0068, P297 and the rationale for a Cost Benefit Analysis

Introduction

Background to the Cost-Benefit Analysis

In its role as the Electricity System Operator (ESO) National Grid is committed to providing transparency to the industry and ensuring that value for consumers is realised through developments to our systems and the industry codes that underpin them. Due to challenges faced in fully implementing EBS, industry changes that were expected to be enabled by the delivery of this system have been delayed. This CBA is to understand whether these changes should be taken forward in a different manner independently of EBS.

Further information

Full modification background information including workgroup reports and decision documents can be found for the modifications via the links below.

P297

P373

GC0068

Background to P297 and GC0068

In 2013 National Grid raised modification proposals to the Grid Code (GC0068 - Grid Code New and Revised Unit Data and Instructions) and the Balancing and Settlement Code (P297 - Receipt and Publication of New and Revised Dynamic Data Items) that expected to take advantage of functionality provided by the Electricity Balancing System (EBS). These modifications were approved by Ofgem in March 2014. Implementation of the Grid Code modification was staged with some elements delivered in July 2014 and some linked to EBS go live which was envisaged at the time of their decision to be Q2 2015; implementation of the BSC modification however required a formal implementation date.

Changes proposed as part of these modifications are described in **Appendix A**. At a high level, the changes in GC0068 relate to changes in Dynamic Data sets being received plus Grid Code housekeeping changes. P297 relates to the use of those revised Dynamic Data items introduced under GC0068, plus another data item amended previously. The specific Dynamic Data elements in question are as follows:

1. **Profiled Balancing Mechanism Unit (BMU) Stable Import and Stable Export Limits (SEL and SIL).** Under the changes proposed SEL and SIL would be time-varying MW profiles rather than being submitted as single static MW values.

2. **Run-Up Rates (Import and Export) and Run-Down Rates (Import and Export).** The changes proposed would allow for a greater number of BMU ramp rates and a change in data resolution to 0.02MW per min

3. **Last Time to Cancel Synchronisation (LTCS)**. This currently exists within the Grid Code but is not passed to Elexon as part of the Dynamic Data set for publication on BMRS.

Delivery of the modifications and addressing industry uncertainty through P373

Delivery of these modifications was expected through the functionality provided by EBS. Although the scheduling element of EBS has now been implemented P297 and GC0068 rely on a different element of the system that relates to dispatch. At this point it is not certain when the functionality required to fulfil these two modifications will be delivered.

This uncertainty has meant that P297 has had a series of implementation dates that have been revised due to our changing expectations of delivery of the system. We have received feedback from stakeholders and via the BSC Panel that certainty around delivery of these changes would be valued. In October 2018, we brought forward a modification (P373 – Reversal of P297) that proposed to remove the original P297 requirements from the BSC. This would then allow the ESO to raise modifications to take forward areas of work that were of benefit to consumers independently of EBS. P373 is currently with Ofgem for decision.

As the remaining elements of the Grid Code modification (GC0068) did not have a specific implementation date we have not yet taken any action under the Grid Code. Depending upon

Ofgem's decision with regards to P373 and this Cost Benefit Analysis we will explore with both industry panels how best to take work forward in this area.

Rationale for a cost-benefit analysis

Despite raising P373 to remove P297 requirements, the ESO wanted to consider whether taking forward elements of the functionality envisaged in GC0068 and P297 outside of EBS would be beneficial. This consideration also allows us to decide how to proceed with implementation arrangements for GC0068, which is currently tied to EBS go-live rather than a specific date.

Within the original P297 and GC0068 modification reports there was considerable focus on the efficiencies that these changes would potentially bring to the market without a full consideration of the costs and benefits of implementation. The marginal cost of implementing the capability was assumed to be zero as it was part of the standard capability of the package being delivered as part of EBS. Given that incremental spend is now required to deliver the proposed capability independently of the EBS dispatch functionality, it is important a cost benefit analysis is performed.

We wrote to stakeholders on 26th October 2018 outlining our plans to conduct analysis to understand the potential costs and benefits to implementing these changes more fully. The purpose of this was to ensure that if benefits are identified then appropriate changes are brought forward, and conversely to ensure that work is further progressed where there is no obvious consumer benefit.

CBA process and this document

Our letter of the 26th October 2018 outlined that this cost-benefit-analysis would be developed from October 2018 – December 2018. As part of this we wrote to all stakeholders on the 6th November 2018[3] asking for evidence in these areas. We value the responses received which are summarised in **Appendix D**. We have taken on board this feedback and used it, and the original evidence given as part of responses to P297 and GC0068, when conducting our assessment of potential costs and benefits. This can be found in Chapters 3 and 4 respectively. Our conclusion and next steps can be found in Chapter 5.

3 https://www.nationalgrideso.com/sites/eso/files/documents/P297%20Nov%2018%20call%20for%20evidence_final_0.pdf

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Benefits assessment

Approach to Cost Benefit Analysis

Benefits assessment

This benefits assessment has considered stakeholder evidence and feedback and the ESO's own quantitative analysis. Deriving an impact assessment for the suite of dynamic parameters proposed in GC0068 and P297 is a complex task principally because the value of some of the dynamic parameters is a function of system conditions at any point in time. We wanted, where possible, to conduct a quantitative evaluation of a dynamic parameter. In this instance this has focussed on time varying SEL. Where the impact of a dynamic parameter is dependent on numerous potential permutations, such as changes to run-up and run-down rates, we have carried out a qualitative assessment as to its benefit. We recognise that some of these changes may have benefits to market participants, however as ESO, we are unable to quantify these due to a lack of commercial information available to us.

Stakeholder evidence on benefits and costs

Within the development of the P297 and GC0068 modifications, there was both a workgroup process and wider consultation with industry undertaken. In terms of benefits identified across these three areas there was considerable focus on the efficiencies that these changes would bring to the market without a full consideration of the costs and benefits of implementation. A summary of responses to the original modifications can be found in **Appendix C**.

In terms of this CBA we did not believe that the evidence from these consultations in 2013 and earlier provided as rich a pool of evidence as we would like. Therefore, we wanted to work with stakeholders to identify areas to consider, so we could ensure that we understood more fully the end consumer benefits that would be delivered through these changes.

We issued a call for evidence on 6th November 2018 and received four responses, one of which has been marked as confidential. The responses received that are non-confidential can be found in **Appendix D**. A summary of these responses can be found in **Table 3.1** below.

Table 3.1

	Benefits & rationale	Priority for delivering benefits	Dis-benefits & rationale
Profiled BMU SIL/SEL	Would allow units to better represent their capabilities and may lead to more efficient dispatch.	High x 1 Medium-high x 1	One respondent believed that implementing this would favour traditional CCGTs as a technology
Increased run up/run down rates	Better ramp rate representation would lead to imbalance exposure reduction for participants.	High x 1 Medium x 1	
LTCS	Transparency is always useful but not high priority at this stage.	Low x 3	

In the feedback we received respondents to the consultation said that there was more value in implementing the Profiled BMU SIL and SEL and Increased Run-Up/Run-Down rate elements, and less benefit in the LTCS item. Benefits were described qualitatively in these responses and no

quantitative information was provided on either potential benefits and costs. Additionally, one respondent also believed some changes should not be taken forward as they favoured traditional CCGT technologies.

Assessment of suitability to quantitative approach.

We set out to determine how to provide appropriate assessments and to see if these views were supported by evidence. We determined that the only parameter where it would be possible for the ESO to provide a quantitative assessment was the **Profiled Balancing Mechanism Unit (BMU) Stable Import and Stable Export Limits (SIL and SEL).** This is because SEL and SIL parameters describe to the system a definitive volume (MW) and it is possible to assess how such a volume may impact on a specific and well-defined balancing service requirement, in this case downward/negative margin requirements. We have focussed on SEL for the purposes of this analysis.

With respect to the impact an **increased number of run-up and run-down rates** might have on balancing costs, we consider that this is dependent on how they can be used to manage underlying system conditions. Furthermore, changes may not only be in relation to the actual parameters but also with respect to offer and bid price submissions associated with the increased number of run up rates. In the absence of any quantitative information provided by stakeholders as to how the run-up/run-down rates might change, together with the associated commercial elements and potential permutations in respect of system conditions, it is not possible to provide a coherent benefit assessment of this element.

Regarding **Last Time to Cancel Synchronisation**, the key issue is how market participants might react to the publication of this additional information. It may lead to changes in behaviour with respect to pricing strategies in the Balancing Mechanism, however, from a balancing services perspective, this change will not materially impact our decision making as it is purely an indicator of when a currently available option is revoked. It is our view that whilst there may be a second order impact in pricing behaviour the potential permutations around this are too numerous and varied in impact to produce a robust quantitative analysis.

Quantitative approach to Profiled Balancing Mechanism Unit (BMU) Stable Import and Stable Export Limits (SEL and SIL)

The principal balancing capability that is impacted by SEL or SIL is the downward margin requirement. This ensures that in real time, the ESO control room has enough capability to immediately reduce the output of BMUs (or increase demand) in order to manage excess supply to the system or a high frequency deviation as a result of a demand loss. This downward margin requirement is set by the ESO at a level where excess supply can be managed across *synchronised* BMUs and it is the cumulative difference between their output (Physical Notification) levels and their SEL/SIL which makes up the requirement. To achieve the requirement, it may be necessary to desynchronise BMUs that are inflexible, either because they are already planning to operate at SEL (and therefore not provide any downward capability) or they are unable to deviate their output at competitive prices because of other commercial obligations, or indeed reduce output at the necessary speed (ramp rate).

Currently, participants are only able to submit a static SEL/SIL which remains active until overwritten by any subsequent redeclaration. The inability for participants to indicate a change in their SEL/SIL in advance of real time can mean that a SEL/SIL that might arise in forward hours as a result of a different operational status cannot be communicated to the ESO and therefore not included in any optimisation process. A more dynamic SEL/SIL would allow parties to indicate to the ESO when capability is available and allow the ESO to use them more frequently to fulfil a downward regulation requirement.

In order to try to estimate the value that might arise from the integration of time varying SEL/SIL into the dispatch process, we conducted a two-part study using simulation tools[4]. This compared the cost of creating a downward margin requirement using the existing static SEL/SIL from existing BMUs, and compared this to a dispatch that used alternative known SEL/SILs. These were taken

[4] We utilise PLEXOS software to carry out our system modelling

from those that have been submitted in the past to the ESO under "Super SEL" contract arrangements[5]. A super-SEL is a lower operating SEL that certain generators can provide, particularly by operating with different configurations for CCGTs. As there is a loss of efficiency in doing this there is usually a cost of provision.

For completeness, a "Max" scenario was also constructed where all gas and coal units were able to operate at historic minimum SELs. This provides an upper bound on the value that could theoretically be achieved through this modification. We compared this to historic costs as per our MBSS report to ensure there were no large discrepancies[6].

Analysis output

The cost of meeting a typical downward requirement is forecast at £144m. This assumes actions are taken in the BM, solely on gas and coal-fuelled thermal units.

The super-SEL model amends SEL levels on units which have super–SEL contracts with NGESO. Under this scenario, costs drop to £104m, indicating a saving of £40m per year. The full results are shown in **Table 3.2** below.

Table 3.2

£m	STATIC	Super SEL	MAX
Nov-18	£ 9	£ 6	£ 4
Dec-18	£ 12	£ 9	£ 7
Jan-19	£ 14	£ 10	£ 8
Feb-19	£ 9	£ 7	£ 5
Mar-19	£ 11	£ 8	£ 5
Apr-19	£ 12	£ 9	£ 7
May-19	£ 11	£ 8	£ 5
Jun-19	£ 8	£ 6	£ 5
Jul-19	£ 9	£ 7	£ 5
Aug-19	£ 10	£ 7	£ 5
Sep-19	£ 20	£ 15	£ 12
Oct-19	£ 18	£ 13	£ 11
	£ 144	**£ 104**	**£ 78**

The average number of units removed per night, by month is presented below in **Table 3.3.** There is little difference between the models. This suggests there will be negligible effect on the number of actions taken by the ESO.

[5] In order to hedge or mitigate costs in the past, NG ESO has entered into bi-lateral contracts via tender to obtain access to lower SEL capabilities

[6] https://www.nationalgrideso.com/balancing-data/system-balancing-reports#tab-3

Table 3.3

	STATIC	Super SEL	MAX
Nov-18	3	3	2
Dec-18	2	2	2
Jan-19	3	3	2
Feb-19	3	3	2
Mar-19	2	2	2
Apr-19	2	2	2
May-19	2	2	1
Jun-19	2	2	2
Jul-19	1	1	1
Aug-19	3	3	2
Sep-19	3	3	3
Oct-19	4	4	3
	2.5	2.5	2

Although not directly reported we have derived the percentage reduction in SEL on the system for the super-SEL case and the maximum-SEL case. This is calculated from the difference between total energy generation and the downwards flexibility per BMU both in GWh. The super-SEL model removes only an average of 4%. As we concluded above that the number of actions to take would not substantially change, the reduction in energy from the system is also small indicating a limited benefit. The full results are shown in **Table 3.4** below.

Table 3.4

GWh	STATIC	Super SEL	REDUCTION	MAX SEL	REDUCTION
Nov-18	1659	1614	3%	1438	13%
Dec-18	1705	1629	4%	1443	15%
Jan-19	1475	1422	4%	1285	13%
Feb-19	1475	1433	3%	1293	12%
Mar-19	1580	1511	4%	1338	15%
Apr-19	1445	1384	4%	1227	15%
May-19	1427	1381	3%	1238	13%
Jun-19	1529	1463	4%	1269	17%
Jul-19	1714	1646	4%	1381	19%
Aug-19	1389	1330	4%	1176	15%
Sep-19	1009	965	4%	898	11%

Oct-19	1040	993	5%	916	12%
			4%		14%

Another way of viewing this is the average MW removed from the system per night each month. This is based on the downward actions taken in the model. In absolute terms the number of MW removed reduces once you implement the super-SEL contracts and is shown in **Table 3.5** below. This is broadly in line with the number of units switched off presented above in **Table 3.4**.

Table 3.5

MW	**STATIC**	**Super SEL**	MAX SEL
Nov-18	631	390	256
Dec-18	466	314	225
Jan-19	596	413	336
Feb-19	534	408	301
Mar-19	547	414	248
Apr-19	346	235	168
May-19	437	255	148
Jun-19	314	219	176
Jul-19	363	180	70
Aug-19	557	396	292
Sep-19	680	534	364
Oct-19	733	554	433
	517	**359**	**252**

Analysis findings

The model suggests that there is a notional benefit of £40m/annum from utilising more granular SELs. This is based on 11 generators that have in the past had bi-lateral contracts with the ESO to operate at a lower SEL in return for a utilisation payment (~£40/MW/hour). The combined reduction in SEL across these units amounts to 1,285MW. Importantly, both scenarios assume that we have a zero residual imbalance position and there are no other interventions from the ESO.

The different models provide a notional benefit to having a lower SEL on some BMUs. It assumes that no other interventions take place from the ESO and that all actions are taken in the Balancing Mechanism (BM) through repositioning BMUs.

Areas for Consideration

The costs outlined here appear to be significantly higher than observed costs (£11m) and there are several reasons for this;

1. In recent years, the ESO has spent significant sums of money managing Rate of Change of Frequency (RoCoF) issues[7], for which the principal and most economic strategy employed is to manage down the largest potential loss on the system. This has typically meant limiting interconnector flows as they are likely to be the largest loss at ~1000MW each. Therefore, reducing output on interconnectors by a few hundred MWs each essentially removes inflexible SEL from the system and reduces the need to take further action so masks a downward margin requirement that would otherwise be apparent.

   The RoCoF issue is nearing resolution as a programme of change is initiated on distributed generation protection equipment. It is likely that the SIL/SEL dynamic data will become more valuable following the resolution of the RoCoF issue as the need to manage down the larger potential loss for RoCoF will significantly reduce, and the value of alternative actions will change.

2. As noted above, the ESO has intervened ahead of the BM and struck contracts with BMUs to provide Super SELs which have mitigated actual costs.[8] These actions are not recognised within the original modelling and the £40m notional benefit would be lower as a result.

3. The model uses a forecast of BM prices. This can mean that a small difference between modelled and observed costs can produce a relatively large difference in overall results as we are looking at large volumes of actions. For example, a £1/MWh difference in the assumed spread between offer and bid prices could change the modelled results by up to £6m.

In summary, it is important to recognise that the £40m identified is a notional benefit that would only be realised once the RoCoF issues are resolved in 2022 and is likely to be moderated by actions already available to the ESO and the potential for varying prices.

Taking all of this into account it is our view that there would be benefit in future years of having foresight of lower operating SELs across BMUs in order to improve optimisation of dispatch in BM timescales. Any ultimate benefit would be highly variable as it depends on pricing behaviour across BMUs and an assumption that the ESO conducts all balancing actions in the BM.

Qualitative view of increased number of run-up rates and run-down rates

From a balancing services perspective, run-up and run-down rates are relevant to the ESO to provide operational information in respect to how BMUs will synchronise and desynchronise to and from the system in the event they are required for use in residual balancing and therefore feed into the dispatch optimisation. However, the discreteness or number of rates that are submitted does not offer intrinsic value. Under the Grid Code, BMUs are expected to provide operational parameters that align with their actual capability and the provision of three run up rates, this has always been sufficient from an ESO perspective to enable efficient dispatch.

When the ESO requires specific dynamic capability, this is procured through services such as fast reserve, which requires a minimum volume and fast run up rate in order to qualify for the service provision. Therefore, more break points and slower run up rates would not directly enable displacement of fast reserve services. The ESO operates the system in the knowledge that

[7] Rate of Change of Frequency issues are being resolved through a programme of changes to desensitise the RoCoF setting as used by smaller generators in their loss of mains protection to detect islanding.

[8] While not directly comparable the value of these contracts was £0.129m in 2016/17 and £0.589m in 2017/18.

generation and demand will fluctuate second by second and the impact of more discrete run-up rates is unlikely to significantly impact this.

It is recognised through responses to our consultation that there might be some value to market participants being able to submit more discrete run up rates. Stakeholders highlighted this specifically for CCGT's, principally because it is envisaged that more accurate profiles can be submitted which will reduce provider's imbalance exposure. As ESO, we are unable to carry out any robust quantitative analysis on this because it would require information as to what the potential change in rates might be across the generation fleet and some form of assessment of how this might change their individual imbalance. Without this input we cannot quantify any potential beneficial effect on overall system imbalance. We would be open to further dialogue if stakeholders identify quantitative evidence of consumer benefits in this area.

Qualitative view of publication of last time to cancel synchronisation

This parameter is provided to the ESO to provide awareness of the last opportunity to stand a unit down that otherwise would have to be synchronised. It is not possible to assess the benefit of publishing the last time to cancel synchronisation to the market via BMRS as it is not clear how this information would be used and applied. We consider that it may provide opportunity to other market participants to offer a more competitive price for the same period with the knowledge that the ESO control room have to commit or otherwise issue a dispatch instruction. However, it is our view that publication of this data would have limited if any benefit to market participants and although it was highlighted in responses to our consultation that transparency was valued it is not clear what actual value this would ultimately provide to consumers.

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Costs

An assessment of potential implementation costs

Potential implementation costs

Summary

GC0068 and P297 are primarily implemented through changes to IT infrastructure. The original implementation of these modifications was expected to take advantage of functionality provided by the Electricity Balancing System and therefore had low anticipated implementation costs. This section covers estimated ESO costs for bringing forward the implementation of elements of GC0068 and P297 using existing systems and architecture. It is anticipated that any changes outside EBS would be complex to implement as they impact on a number of operational systems. Due to the systems impacted changes would be made following the implementation of TERRE and Wider Access in December 2019. This would suggest a possible delivery of November 2020.

Scope of systems impacted and current work schedule

GC0068 and P297 are primarily implemented through changes to IS infrastructure. The IS infrastructure that underpins the balancing GB transmission system is complex and interlinked. Implementing GC0068 and P297 using existing systems and architecture independently of EBS impacts a number of systems in the ESO's toolkit.

Due to the level and pace of change within the industry, there are a number of projects being undertaken that impact the ESO's systems significantly. These include, but are not limited to, TERRE & wider access, Platform for Ancillary Services, onboarding of interconnectors and replacement of settlement systems. Whilst the impact assessment has been designed to align work where possible, the timelines are a result of needing to be scheduled against work that we have committed to deliver to our stakeholders.

System areas and level of impact

System changes required to implement the different elements of GC0068 and P297 can be split into three categories: balancing, settlement and reporting. The impact in each of these areas is shown in **Table 4.1** below.

Table 4.1

System area	Profiled BMU SIL/SEL	Increased no. Ramp Rates	LTCS	Comments on level of impact / delivery timescale
	Relevant system impacts			
Balancing	Yes	Yes	No	High impact. Changes anticipated to take 6-12 months to develop.
Reporting	Yes	Yes	Yes	High impact on some systems, low on others. Dependent on prior changes in balancing systems
Settlement	Yes	Yes	No	High impact. Changes anticipated to take 6-12 months to develop. Replacement system also currently scheduled for 2020.

In terms of the impacts highlighted, these are all cited as high due to both the complexity of the changes required and also because of the inter-relationship with the other ongoing changes mentioned below.

Due to the challenging nature of the changes already in progress within the ESO portfolio we recommend that the TERRE & Wider Access changes continue to progress as a priority to protect the go-live date. Once this has concluded work could begin on GC0068 and P297 with greater confidence in delivery. Therefore, we would recommend implementing any changes relating to GC0068 and P297 in November 2020.

Potential ESO costs to implement

We anticipate that the total IT costs to implement the three elements covered by this Cost Benefit Analysis would be around £2.5m, based on a high-level cost estimate of the changes required. This is split out roughly as follows by each element of the CBA in **Table 4.2** below:

Table 4.2

Element	Approximate cost
Profiled BMU SIL/SEL	£700k
Increased no. ramp rates	£1.65m
LTCS	£150k
Total	£2.5m

In addition, to implement these changes we would anticipate incurring costs of around £250k for amendments our processes, training and documentation.

Elexon costs to implement

Elexon have fed back the following in relation to their costs to implement:

> *Since the time of the initial P297 Impact Assessment, there has been significant development of our BSC Central Systems through subsequent change work that may have a material effect on the timescales and/or costs of delivering part or all of the P297 functionality.*
>
> *We are also currently progressing through our Foundation Programme, which is re-developing BSC Central Systems onto a new systems architecture platform. Therefore, the architecture that P297 functionality would be developed on through further BSC Change may be fundamentally different from the architecture that P297 functionality was initially impact assessed against. Due to this, it is currently unclear what the delivery timescales or costs for P297 functionality would be.*
>
> *We can conduct an Impact Assessment analysis on delivering all, or part of the P297 provisions, and would be willing to work with both National Grid ESO and Ofgem to provide this information should it be required. However, at the current time we cannot commit to outlining the costs of delivering part, or all of the P297 solution in the short timescales before the ESO has committed to providing results of its P297 cost-benefit analysis to Ofgem.*

External stakeholder costs to implement

Costs to implement any changes that are brought forward do not include any specific costs for stakeholders.

In our stakeholder call for evidence relating to this CBA we issued a confirmation to stakeholders that cost evidence was welcome as part of their evidence, but no specific costs were highlighted by stakeholders. However, one respondent cited that they did not feel that implementing these changes were an appropriate use of resource for the ESO.

Other implementation considerations

Our IS implementation programmes are subject to prioritisation depending upon the nature of the deliverable required. As we have outlined above we would prioritise other known deliverables such as TERRE, Wider Access and PAS over GC0068 and P297 as we recognise the higher value of these to stakeholders. We want to ensure that stakeholders are aware that other items such as the setup of interconnectors and programmes such as Power Available may also need to be considered in the prioritisation of changes to our systems if the changes within GC0068 and P297 were identified as a high priority.

We would welcome input from parties on whether we should make the changes identified within GC0068 and P297 a priority over other elements of our balancing programmes.

5

Conclusion

Next steps

Conclusion

Summary

The ESO believes that there is only evidence to support implementing the SIL/SEL element in advance of full EBS go-live. To that end, the ESO plan to raise new changes in 2019 to facilitate this.

Views on the CBA results

As outlined in Chapter 3, the ESO sought to perform an analysis of consumer benefits of each of the three identified elements from P297 and GC0068. This was to be supported by evidence submitted as part of a call for evidence from stakeholders. Our view on the outcome of the CBA for each of these areas is below:

Profiled Balancing Mechanism Unit (BMU) Stable Import and Stable Export Limits (SIL and SEL)

The ESO has been able to undertake sufficient analysis to identify some benefits to consumers of implementing these changes. This is supported by stakeholder feedback received as part of the call for evidence. Set against a £700k ESO estimate of implementation cost we believe there is likely to be benefit in taking this change forward subject to industry consultation and debate. We will discuss with the relevant code administrators, industry panels and forums on how best to take this forward.

Increased run up/run down rates

We did not receive a sufficient level of quantitative evidence from stakeholders to allow us to perform a more detailed analysis on these elements. As no benefits are able to be quantified at this stage, against a cost estimate of £1.165m for the ESO to implement (excluding those which would be borne by Elexon and wider industry) we do not believe that it would be in the interests of the end consumer to implement these changes without further analysis and quantitative assessment through an industry change process. We recognise that some of the call for evidence responses identified there may be some benefits of making these changes and although we will not carry forward work at this time, we welcome future input from market participants if they are able to share any more quantitative evidence to support these views.

Last Time to Cancel Synchronisation

We did not receive a sufficient level of quantitative evidence from stakeholders to allow us to perform a more detailed analysis on this element. Implementing this change was also considered low priority by stakeholders so we do not propose any further action at this stage.

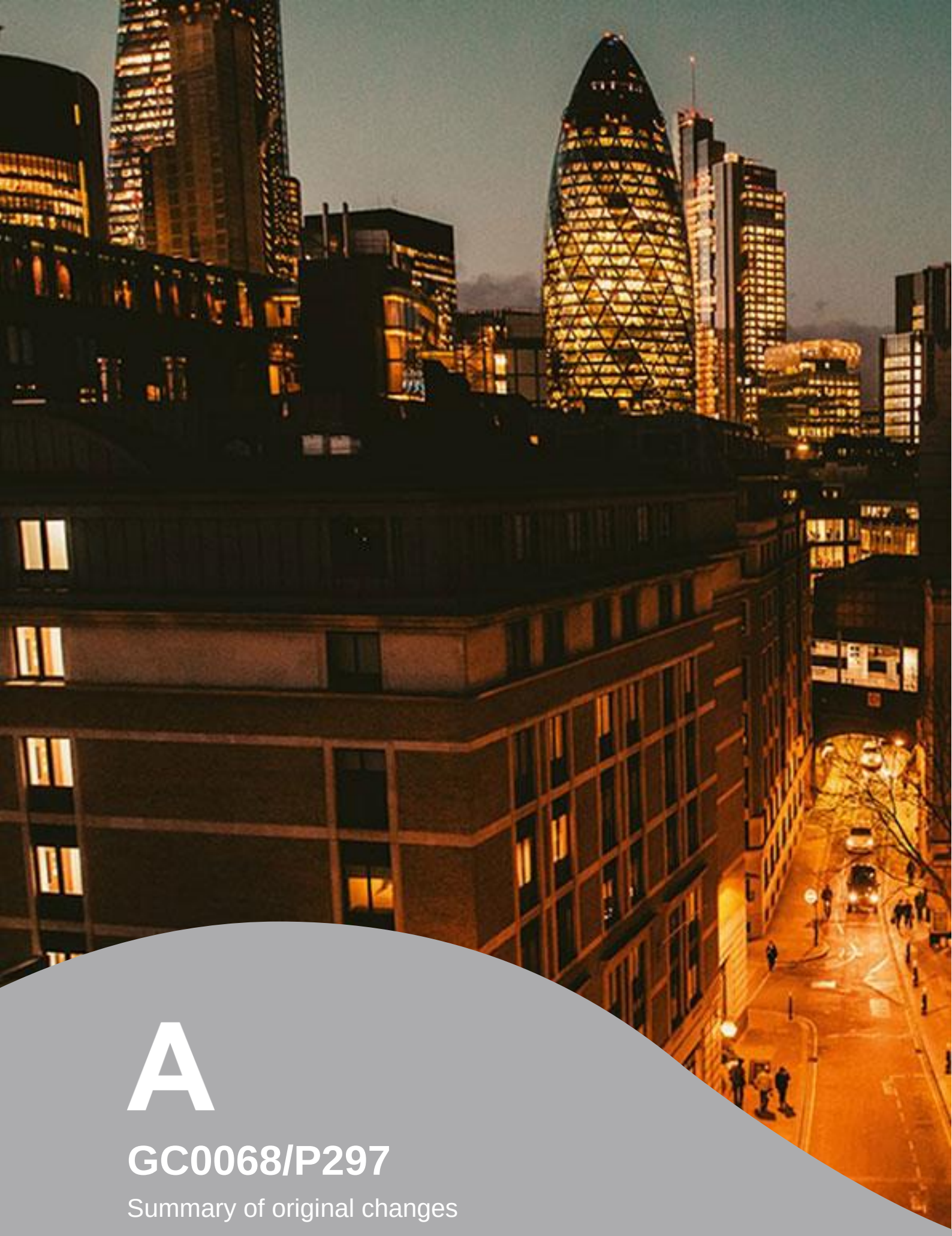
Next steps

We want to ensure that we achieve the most value for the end consumer and have concluded that there is a benefit to taking forward work to implement the **Profiled BMU SIL and SEL changes** through the ESO's existing systems and architecture, as there will be some savings for consumers. These savings are likely to be variable due to future market circumstances, but we consider they are worth pursuing at this time.

In terms of GC0068 we will consult the Grid Code Review Panel on how best to take Profiled BMU SIL and SEL changes forward. From a BSC perspective, if P373 is approved by Ofgem, we will raise changes in 2019 to include the pass through of these data flows to Elexon for publication on BRMS following the conclusion of the Grid Code process.

With regard to **Run-Up Rates (Import and Export), Run-Down Rates (Import and Export) and Last Time to Cancel Sync** we do not believe that we have identified or been presented with sufficient evidence at this point in time to recommend that changes are taken forward. We therefore do not plan to take these elements forward but would be open to further dialogue if stakeholders identify new evidence of consumer benefits.

We welcome stakeholder views on this approach. If you have any specific feedback then please email us at balancingservices@nationalgrid.com .



A

GC0068/P297

Summary of original changes

Changes covered within GC0068/P297 original modifications

GC0068

Below is a summary of changes outlined under GC0068 which comprise the Dynamic Data functionality changes outlined in the letter alongside the Grid Code housekeeping changes.

Dynamic Data set functionality changes

SIL/SEL

The Stable Import Limit (SIL) and Stable Export Limit (SEL) are currently both submitted as single static MW values. GC0068 allows time varying profiles to be submitted.

In Grid Code, under BC2.5.3.1, it is stated that a submission of Dynamic Parameters from a BM Participant will take effect from time of receipt by National Grid. This statement was valid whilst the Dynamic Parameters consisted only of static point values. However, it would no longer apply to SEL and SIL when submissions of time-varying profiles. GC0068 also removes the statement and replaces it with similar statements, within the introductions to Dynamic Parameters in BC2.A.X.2 and BC2.A.X.3, explicitly indicating the SEL and SIL as exceptions in the case of new EBS interfaces.

Run-Up Rates (Import and Export) and Run-Down Rate (Import and Export) Currently up to three Run-Up / Run-Down rates can be submitted at a minimum of 0.2MW/min. GC0068 allows up to ten Run-Up / Run-Down rates to be submitted at a minimum of 0.02MW/min.

Housekeeping changes

Notification to Deviate from Zero

Currently the Grid Code provides no information on the arrangements that should apply when a BM Unit is deviating from zero following being bid off. Since the introduction of NETA in 2001, custom and practice has been established to achieve this, but it is undocumented in the Grid Code. Under GC0068 a new section in BC2 is added, BC2.5.2.6, to detail the arrangements for the deviation of a BM Unit from zero that has been operating at zero as a result of Bid-Offer Acceptances. This clarification is for reference in the case of dispute and for the benefit of new entrants.

Removal of Day Ahead Dynamic Parameters

GC0068 removes Day Ahead Dynamic Parameters, BC1.4.2(e), from the Grid Code Day Ahead Dynamic Parameters are no longer used by the ESO and their submission potentially represents an overhead to market participants. Note that the Dynamic Parameters used in the current Operational Day are those submitted in accordance with BC2.5.3.1.

Transfer of Day Ahead Dynamic Parameters Grid Code Sections

As the main use of Dynamic Parameters is post gate closure, particularly with the removal of Day Ahead Dynamic Parameters from the Grid Code, GC0068 transfers the Dynamic Parameter details from BC1 (Appendix 1.5) to the Appendix of BC2.

Revision of Tap Change description

GC0068 revises the description of **Tap Changes**, to include details from the Operational Guidance Note for Simultaneous Tap Changes. Also, the definition of **Simultaneous Tap Change** is updated

to reflect the arrangements for Simultaneous Tap Change instructions that are detailed in the Grid Code associated document.

EDL/EDT*

Automatic Logging Device and Electronic Data Communication Facilities are both used in the Grid Code but currently as undefined terms. GC0068 introduces definitions for these generic terms, and two further interface-specific definitions each indicated by a suffix to the term.

'Automatic Logging Device (EDL)' is used to represent the existing interface for issuing instructions and **'Electronic Data Communication Facilities (EDL & EDT)'** are used for the existing interfaces for submitting data.

'Automatic Logging Device (EDL*)' is used to represent a new interface for issuing instructions and **'Electronic Data Communication Facilities (EDT*)'** for a new interface for submitting data.

The introduction of these terms is to facilitate a five year transition period following the adoption of new systems. GC0068 does not detail what the new EDL* and EDT* are, but does allow for Changes to Dynamic Parameter Attributes.

To facilitate the transition period, parallel sections detailing the attributes of certain Dynamic Parameters, depending on whether the existing interface (EDL) or the new interface (EDT*) is being used, are added to the Grid Code.

P297

Under P297 the following data sets would be passed from the ESO to Elexon for publication on the Balancing Mechanism Reporting Service (BMRS).

NEW Data Item: Last Time to Cancel Synchronisation (LTCS).

This is currently live in the Grid Code but not in the BSC.

Revised Data Item: Run-Up Rates (Import and Export) and Run-Down Rate (Import and Export)

This would pass through any data received under GC0068 ramp rate changes.

Revised Data Items: Stable Export Limits and Stable Import Limits

This would pass through any data received under GC0068 SEL/SIL changes.

B

CBA deliverables timeline

Appendix B - Timeline of deliverables for CBA

Milestone	Date
Update Grid Code Panel on P297 discussions and potential GC0068 impacts	17th October 2018
Open letter to stakeholders to set out the CBA process	w/c 22nd October 2018
Targeted engagement with key stakeholders including Independent Generators Group, Flexible Generators Group, other identified interested parties	22nd October – 2nd November 2018
Wider consultation with stakeholders on potential areas of benefit	**5th – 19th November 2018**
Update on progress at BSC & Grid Code Panels – present initial feedback from evidence gathering	8th & 21st November 2018
Publication of CBA	w/c 7th January 2019
Update on results of CBA at BSC & Grid Code Panels	10th & 24th January 2019
New modifications submitted if appropriate	February or March 2019

C

Original benefits identified

Summarised responses to P297/GC0068 consultations

Original benefits identified as part of P297 & GC0068 consultations

Consultation	Summary of benefits identified
2010 EBS consultation 2010 (included as talks about data changes ahead of mods)	• Consumer benefit not specifically mentioned • Most of the perceived benefits of the changes are around better modelling of CCGTs however benefits not quantified
GC0068 consultations 2013-14	• Enhancements to datasets increase the potential for NG to model BMUs and enable more efficient dispatch however this was not quantified. • Better modelling of CCGTs with SIL and SEL changes and increased ramp rate variation capability reduces parties imbalance exposure and facilitates competition. These were not quantified. • For the reasons above, of 5 consultation responses, all 5 agreed that the modification was positive against Grid Code objectives i (to permit the development, maintenance and operation of an efficient, co-ordinated and economical system for the transmission of electricity), ii (to facilitate competition in the generation and supply of electricity and iii (to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole). • One consultation respondent unsure of benefits of granularity moving from 0.2 to 0.02MW/min given the amount of time taken to ramp at this speed.
P297 consultations 2013-14	• Over and above benefits already mentioned as part of GC0068 above in terms of better dispatch decisions, respondents identified benefits to competition and efficiency as a result of increased information to the market. • Both Assessment Consultations unanimously agreed with the Workgroup's unanimous view that P297 would better facilitate Applicable BSC Objective C (promoting effective competition in the generation and supply of electricity) and a minority view that P297 would better facilitate Applicable BSC Objectives B (the efficient, economic and co-ordinated operation of the national electricity transmission system) and D (promoting efficiency in the implementation and administration of the balancing and settlement arrangements). • A minority of respondents also agreed with the Workgroup's minority view that P297 would have a slight detrimental impact against Applicable BSC Objective D as there would be a cost for industry to implement.

D

Call for evidence 2018

Response Summary

2018 call for evidence response summary

Questions	Responses received
Do you believe there are benefits to creating time-varying MW profiles for SEL and SIL? If so what might these be? Are there benefits in publishing these on BMRS? Is this a low, medium or high priority?	
Seabank Power	• Yes we believe there will be benefits to the market. A time varying SEL could be used by CCGT's (and other) plants to better represent the minimum load achievable during any given day. Specifically for CCGT plants, like MEL, the SEL can change with varying weather conditions, thus more accurately reflecting the range between SEL & MEL that could be provided. Medium/High Priority
RWE	• This would be of value for our CCGT units to profile running between 1+1 and 2+1 (Gas turbine + Steam turbine), this would provide better balancing granularity and likely to allow smaller MWh volumes for overnight running. SEL/SIL are like MEL/MIL in terms of an operational capability/constraint and should be reported consistently.
UK Power Reserve	• The introduction of time-varying SEL/SIL would favour specific technologies (especially CCGTs), as clearly pointed out in the 2013 GC0068 Industry Consultation. As such, we would still be witnessing a technology-led approach, favouring larger units and not tapping into the full value to the system of smaller assets such as gas reciprocating units.
Do you believe there are benefits to allowing a greater number of BMU ramp rates and a change in data resolution to 0.02MW? If so, what might these be? Are there benefits in publishing these on BMRS? Is this a low, medium or high priority?	
Seabank	• Yes we believe there are benefits to having a greater number of ramp rates with a corresponding change in data resolution. For CCGT plants, particularly those with multiple generator configuration, it is not possible to accurately represent the run up of a BMU from 0MW to MEL. With more breaks points and greater resolution, we could more accurately reflect the load profile of the BMU and prevent imbalance. In particular there are occasions where we need to have a static load profile in order to carry out plant operations on a run up, a 0.02MW/Min resolution will allow us to perform these operations without causing system imbalance. High Priority
RWE	• .A greater number of ramp rates and break points would be of great value for PN accuracy with our CCGT units, in particularly the older units where hold points should be used to manage heat expansion during run up, it is something we were looking to employ and would be disappointed if National Grid failed to implement this. As for publishing, we would be of the opinion that it is of low priority but it would add to transparency and accuracy.
UK Power Reserve	• On the greater granularity of Run-Up and Run-Down Rates, this change might allow to take a step away from the traditional data flows looking at chunks of 300MW but we have doubts that a change in data resolution to 0.02MW/minute will actually favour visibility of smaller capacities in the dispatch log: so far we had proofs that smaller units are hardly dispatched and a more granular system might only exacerbate the opaque system we are participating in.

Do you believe there are benefits in introducing data flows for Last Time to Cancel Synchronisation for publication on the BMRS? If so, what might these be? Is this a low, medium or high priority?	
Seabank Power	• Yes we believe this will provide further market transparency. Low Priority
RWE	• We believe this is of minimal advantage and is not something we have considered since [respondent specific information removed].
General comments	
UK Power Reserve	UK Power Reserve has been stating in numerous occasions the frustration from the failure of National Grid ESO to implement the EBS* system. We, and the rest of the industry, have been calling to address this issue, in particular the roll out of an automated dispatch platform to guarantee a level playing field for smaller providers to be able to fairly access the market and compete with other participants. Regardless of this, National Grid has now taken the decision to reverse the changes of P297, by nullifying a modification that was approved by Ofgem. We recognise the ultimate intention of the BSC Panel to provide a degree of certainty to market participants by allowing P297 to be nullified: National Grid had in fact admitted that it cannot provide the data required by P297 due to the lack of delivery of fundamental systems changes. Yet, we are concerned with the precedent of Ofgem not holding to account a party non-compliant with the implementation of an approved modification. Industry is now faced with unprecedented circumstances and with the missed roll-out of well-overdue systems changes that would have granted fair access and dispatch of all BM units, without discrimination on the clip-size. In this Call for Evidence, National Grid ESO is now asking industry to reflect on the benefits to bringing forward elements of the functionality envisaged in GC0068 and P297, seemingly without any indication that the ESO is keen to evaluate the negative implications for -and costs incurred by- industry participants due to the missed implementation of the EBS* system. NG promised the industry that the EBS* system would solve these BM access issues but has failed to deliver, despite the industry putting faith in NG's ability to deliver by investing in smaller capacity on this basis. The new Ancillary Services Dispatch Platform (ASDP) is welcome but we understand[1] that it is still far from being a fully functional and equitably proven system. Currently, the system is being trialled with Fast Reserve - which means that the requirements of smaller parties and those participating in the STOR market are not yet being considered. Therefore, although UKPR supports a system that would guarantee a non-discriminatory access to the BM, we doubt that the more granular data required for the listed Dynamic Data elements would provide any support for market participant to fairly access the BM. In particular, the introduction of time-varying SEL/SIL would favour specific technologies (especially CCGTs), as clearly pointed out in the

	2013 GC0068 Industry Consultation. As such, we would still be witnessing a technology-led approach, favouring larger units and not tapping into the full value to the system of smaller assets such as gas reciprocating units. On the greater granularity of Run-Up and Run-Down Rates, this change might allow to take a step away from the traditional data flows looking at chunks of 300MW but we have doubts that a change in data resolution to 0.02MW/minute will actually favour visibility of smaller capacities in the dispatch log: so far we had proofs that smaller units are hardly dispatched and a more granular system might only exacerbate the opaque system we are participating in. In addition to these arguments, the full cost-benefit analysis should take into account the costs that participants would have to incur to install the necessary metering equipment to be able to provide the precision and high-resolution data that would be required by the changes to the indicated Dynamic Data element. To conclude, UKPR can hardly see the benefits to bringing forward elements of the functionality envisaged in GC0068 and P297 or to provide a judgement on the priority of these changes: the call for evidence is coming way too late in the process and as things stand, we find it difficult to discuss "priority" of the changes, when the whole system has failed to even deliver the confidence to market players that discriminations on clip size would be duly addressed.

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