

Decision Paper

Interim Performance Scalar

Revised Methodology

DS3 System Services Implementation Project

June 2017



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Executive Summary

Introduction and Background

EirGrid and SONI are the Transmission System Operators (TSOs) in Ireland and Northern Ireland. We are responsible for maintaining a safe, secure, reliable and economical electricity system. We are also required to facilitate increased levels of renewable energy arising from energy policy objectives in Northern Ireland and Ireland.

In 2011, we established our '*Delivering a Secure Sustainable Electricity System (DS3)*' programme. The objective of the DS3 Programme, of which System Services is a part, is to meet the challenges of operating the electricity system in a safe, secure and efficient manner while facilitating higher levels of renewable energy.

The aim of the System Services work stream is to put in place the correct structure, level and type of services in order to ensure that the system can operate securely with higher levels of non-synchronous renewable generation (up to 75% instantaneous penetration). Operating in this manner will reduce the level of curtailment for wind farms and should deliver significant savings to consumers through lower wholesale energy prices.

In October 2016, the TSOs completed the procurement of 11 system services (including four new services) resulting in 107 providing units being added to separate Interim Framework Agreements in Ireland and Northern Ireland. As part of this process the new DS3 Performance Scalar described in the [DS3 System Services Interim Protocol Document V1.0](#) was also implemented. Since the Introduction of the Performance Scalar a large volume of feedback has been received from Industry leading to the TSO publishing a [consultation paper](#) on a number of proposed revisions to the Interim Performance Scalar Calculation Methodology to better address industry concerns raised.

This decision paper provides an overview of responses received as well as the TSOs final decisions on the proposed revisions to the Performance Scalar methodology.

For clarity, this decision paper applies to the Interim Performance Scalar methodology. The Regulatory Authorities and TSOs will separately engage in the coming months on the Regulated Arrangements set to apply from May 2018 onwards with consultations on the system services volume requirements, enduring scalar designs and the regulated tariffs planned for July 2017.

Overview of Interim Performance Scalar Revised

Methodology TSO Decisions

In respect to the TSO proposals outlined in the consultation paper the TSO has made the decision to progress all proposals in line with what was outlined within the consultation paper with the exception of two aspects;

1. The Use of Not Applicable (N/A) for Reserve Assessments where the Expected Response is negative due to applicable tolerances – The TSO have revised their proposal slightly to account for the award a Pass Data record when a unit's achieved response is greater than or equal to the initial expected response (ignoring tolerances) in cases where the overall expected values is less than 0 MW.
2. The application of Performance Testing in data poor scenarios where little or no performance data is available – The TSO have revised their overall approach including a number of mitigations to limit the amount of and costs associated with performance testing such as;
 - a. Increasing the entry point into this data poor scalar calculation from 8 months to 12,
 - b. Utilisation of historical evidence of performance in line with current plant running regimes (including response to smaller frequency disturbances and previous test results),
 - c. When did the last assessable performance event occur; and
 - d. Accounting for how often is the unit available to provide the service.

Depending on each Providing Units circumstances in relation to the above criteria only then must they enter into the performance testing process. Within this process, it is still proposed that each test should be specified and agreed on a case by case basis with the Service Provider. Care will be taken when scheduling a test however to try accommodate in line with other tests which may be required by that unit more generally and minimise the amount of testing required as much as possible.

Next Steps

Next steps alongside the publication of this decision paper are the approval and publication of an updated DS3 System Services Protocol Document by end of June 2017. Following this, it is proposed to implement all relevant changes starting from 01 July 2017 with the exception of the proposed changes to calculation of Secondary Operating Reserve (SOR) and Tertiary Operating Reserve 1 (TOR1) which are proposed to go live sometime around Q4 2017. These changes will be preceded by an update to the DS3 System Services protocol document in advance to account for the changes.

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1 Introduction

1.1 SONI and EirGrid

EirGrid and SONI are the Transmission System Operators (TSOs) in Ireland and Northern Ireland. It is our responsibility to manage the electricity supply and the flow of power from generators to consumers. Electricity is generated from gas, coal, peat and renewable sources (such as wind and hydro power) at sites across the island. Our high voltage transmission network then transports electricity to high demand centres, such as cities, towns and industrial sites.

We have a responsibility to enable increased levels of renewable energy to generate on the power system. However, we want to make sure that the system operates securely and efficiently, while allowing for more renewable energy. In 2010, we published the results of the “*Facilitation of Renewables*” studies. Those studies identified a metric called “*System Non-Synchronous Penetration*” (SNSP) as a useful proxy for the capability to operate the power system safely, securely and efficiently with high levels of renewable generation. SNSP is a real-time measure of the percentage of generation that comes from non-synchronous¹ sources, such as wind generation, relative to the system demand.

The studies in 2010 identified 50% as the maximum level of non-synchronous renewable generation allowable on the power system until solutions could be found to the various technical challenges identified. If this limit had not been increased, curtailment on installed wind could have risen to over 25% per annum.

1.2 The DS3 Programme

Our ‘*Delivering a Secure Sustainable Electricity System (DS3)*’ programme sought to address the challenges of increasing the allowable SNSP up to 75% by 2020 where by the curtailment of wind would be reduced to approximately 5% per annum.

DS3 incorporates mutually reinforcing innovative technical, engineering, economic and regulatory initiatives. It is divided into three pillars:

- System Performance
- System Policies
- System Tools

DS3 is not only making the necessary operational changes to manage more renewable generation, it is also about the evolution of the wider electricity industry and implementing changes that benefit the end consumer. From the onset, the integration of wind generation presented a range of challenges previously

¹ Non-synchronous generators supply power to the electrical grid via power electronics. Power electronics are used to adjust the speed and frequency of the generated energy (typically associated with wind energy) to match the speed and frequency of the transmission network.

unseen in the power sector. Through collaboration with the Regulatory Authorities and the wider electricity industry, DS3 has developed a number of innovative and progressive solutions.

The results of the programme are now beginning to deliver benefits to the consumer. On 1 March 2016, the allowable SNSP level was increased from 50% to 55% following the successful conclusion of a 55% SNSP operational trial.

More recently, on 9 March 2017, the allowable SNSP level was increased further to 60% following a similarly successful operational trial. It is expected that similar trials will be conducted in the coming years with a view to achieving the overall goal of 75% SNSP by 2020 in a controlled manner.

1.3 DS3 System Services Process

The objective of the DS3 Programme, of which System Services is a part, is to meet the challenges of operating the electricity system in a safe, secure and efficient manner while facilitating higher levels of renewable energy.

One of the key work streams in the DS3 Programme is the System Services work stream. The aim of the System Services work stream is to put in place the correct structure, level and type of services in order to ensure that the system can operate securely with higher levels of non-synchronous renewable generation (up to 75% instantaneous penetration). Operating in this manner will reduce the level of curtailment for wind (and solar) farms and should deliver significant savings to consumers through lower wholesale energy prices.

In December 2014, the SEM Committee published a decision paper on the high-level design for the procurement of DS3 System Services (SEM-14-108)².

The SEM Committee's decision framework aims to achieve the following:

- Provide a framework for the introduction of a competitive mechanism for procurement of system services;
- Provide certainty for the renewables industry that the regulatory structures and regulatory decisions are in place to secure the procurement of the required volumes of system services;
- Provide certainty to new providers of System Services that the procurement framework provides a mechanism against which significant investments can be financed;
- Provide clarity to existing providers of system services that they will receive appropriate remuneration for the services which they provide;

² DS3 System Services Procurement Design and Emerging Thinking Decision Paper (SEM-14-108): <http://www.semcommittee.eu/GetAttachment.aspx?id=c0f2659b-5d38-4e45-bac0-dd5d92cda150>

- Provide clarity to the TSOs that the required system services can be procured from 2016 onwards in order to maintain the secure operation of the system as the level of wind increases;
- Provide clarity to the Governments in Ireland and Northern Ireland (and indeed the European Commission) that appropriate structures are in place to assist in the delivery of the 2020 renewables targets;
- Ensure that Article 16 of Directive 2009/EC/28 is being effectively implemented (duty to minimise curtailment of renewable electricity);
- Provide assurance to consumers that savings in the cost of wholesale electricity which can be delivered through higher levels of wind on the electricity system, can be harnessed for the benefit of consumers;
- Provide assurance to consumers that they will not pay more through system services than the benefit in terms of System Marginal Price (SMP) savings which higher levels of wind can deliver³.

1.4 Interim Performance Scalar Methodologies

This section details at a high level the key features of the current interim performance scalar methodology. Full details of the current methodology are outlined in the [DS3-System Services Protocol Document V1.0](#), including explanations of all of the technical terms used in this document.

Pass - Fail Assessment Methodology

- Performance scalars currently apply to 9 of the 11 services which went live in October 2016. Steady State Reactive Power (SSRP) and Synchronous Inertial Response (SIR) have no performance scaling applied.
- Primary, Secondary and Tertiary 1 Operating Reserves (POR, SOR and TOR1) carry over the performance assessment methodologies used under Harmonised Ancillary Services (HAS) previously. A binary result (1 or 0) is calculated per event. If a unit fails to achieve performance within 90% or 1 Megawatt (MW) of its expected value for frequency events where the frequency nadir dropped below 49.5 Hertz (Hz), this is deemed a fail and the service provider is allocated a value of 0 for this event. If a service provider's expected response is less than 0 MW following the subtraction of applicable tolerances then the providing unit is not assessed for that event, i.e set as Not Applicable (N/A).
- For the Tertiary Operating Reserve 2 (TOR2) and Replacement Reserve Synchronised (RRS) services, the TOR1 performance scalar value for that providing unit is applied to these services.

³ Note: the composition of the price that will be paid by end consumers for wholesale electricity will change significantly following the introduction of the I-SEM trading arrangements. The savings delivered by DS3 will be split across the imbalance settlement, balancing costs, the price in the ex-ante markets and the Capacity Remuneration Mechanism.

- For Replacement Reserve De-synchronised (RRD) and Ramping Margin 1, 3 and 8 hours (RM1, RM3 and RM8), performance is assessed against whether a unit fails to synchronise in the expected timeframe and is based on the existing Fail to Sync process. A binary result (1 or 0) is calculated per event. DSUs are the only exception to this. They are assessed against the performance compliance requirements specified in both the SONI and EirGrid Grid Codes.

Performance Scaling

A performance scaling value is calculated monthly for each service provider, based on its performance against the pass – fail assessment methodologies summarised above. The value is calculated through assessing their performance over a number of their most recent events. This is calculated as follows;

Reliability equals the sum of passed events / total number of assessable events:

- If Reliability <50%, the performance scalar equals 0;
- If Reliability >90%, the performance scalar equals 1.

Otherwise, the performance scalar is calculated using the equation shown in Equation 1 below. This gives a straight line increase from 50% up to 90%.

$$((\text{Reliability}(\%) - 50) * 2.5)/100$$

Equation 1: Performance Scalar Reliability Calculation

As performance scalars are based over a number of events, consideration needs to be given to the approach to take when there is too much or too little data to assess performance. Under the DS3 System Services Performance Scalar methodology there are four categories of data richness as shown in Table 1. To summarise, if a unit does not have at least 5 assessable events over a two year timeframe to assess performance a modified calculation approach is applied. This approach uses the unit's own performance data where available. Where this is not available, a calculated industry average performance scalar value is used to artificially create additional data records to give them an equivalent of five performance events to assess performance against. The industry average performance scalar is calculated as the summation of all passes divided by the summation of all performance assessments over all contracted providing units, irrespective of their technology classification.

Category	Trigger
Weighted Industry Average	> 5 Events over 24 Month Assessment Period
Own Data	5-10 Events over 24 Month Assessment Period
Last 10 Events	> 10 Events over 24 Months AND < 10 within Assessment Month
Last Month	> 10 Events within Assessment Month

Table 1: Data Richness Categorisation of current DS3 Performance Scalar Methodology

Performance Scalars and Data Packs

The first set of data packs were issued to service providers in November 2016. Data packs are issued to service providers on a monthly basis to provide details on a unit's performance scalar values for each month.

Performance data is integrated into the existing settlement timelines and applied monthly in arrears. For example, performance data up to end of November is used to create performance scalar reports for the December settlement month. The resultant payment (including a reduction should a performance scalar of less than 1 apply) will appear in the Service Providers' invoice in early February.

The current arrangement is that at the end of each calendar month, the TSOs issue performance scalar data packs to individual service providers. Should a service provider seek to challenge its performance scalars, they have 10 working days from the date of issuance to do so. After this point a data freeze date is reached and the performance scalar values are used to settle for the month in question.

Process timelines are outlined in Table 2 below.

Acronym	Meaning
D _E	Date of Performance Event
D _E + 3	Date Operating Reserve report due to issue (details Pass / Fail outcome)
D	Last day of a calendar month
D +10 _{WD}	Date of Performance Scalar Data Pack release
D +20 _{WD}	Date that Data Pack Queries / Challenges must be raised by

Table 2: Key Dates for Monthly Performance Scalar Process

Performance Testing

From time to time, a performance test can be requested by service providers. Its purpose is twofold:

1. *Performance Rectification* – units that had poor historical performance but carry out significant changes to their plant to rectify the issue require a mechanism to improve their performance scalar upon completion of this work.
2. *Performance Data Supplementation* – units considered as 'data poor' with little or no performance data require an alternative mechanism to demonstrate their performance and move off of an industry average performance scalar value.

Upon completion of the relevant performance testing procedures, and submission and approval of relevant reports and documentation, two pass data records can be assigned to adjust a unit's performance scalar value.

1.5 Purpose of this Paper

The purpose of this paper is to update stakeholders with the TSO final decisions in respect to the Interim DS3 Performance Scalar methodologies, following feedback received from the consultation which closed on 10 May 2017. Additionally, this paper will outline a number of next steps and timelines for implementation of the revisions to the DS3 Performance Scalar methodology.

1.6 Structure of this Paper

Section 2 contains the TSOs decision on the Interim Performance Scalar proposed revisions, following input from industry and Section 3 covers in detail specific points and issues raised by respondents during the consultation and sets out the TSOs views on each issue and associated decision.

2 TSOs Decisions on Consultation

2.1 Use of N/A when tolerances exceed initial Expected Response

TSO Initial Proposal:

1. Award a Pass Data record when a unit's achieved response is greater than the initial expected response (ignoring tolerances) in cases where the overall expected values is less than 0 MW.
2. Both the lesser of 10% / 1MW and the POR Inertia Credit Tolerance were proposed to remain netted off the units expected response

TSO Decision:

1. Award a Pass Data record when a unit's achieved response is greater than or equal to the initial expected response (ignoring tolerances) in cases where the overall expected values is less than 0 MW.
2. All applicable tolerances are proposed to remain netted off a units expected response.

2.2 Calculation of Achieved SOR and TOR1

TSO Initial Proposal:

Utilise a time weighted average approach for the calculation of SOR and TOR1 following completion of relevant system changes and retain the existing methodology until then (currently estimated delivery date of Q4 2017).

TSO Decision:

Implement TSO initial proposal as described above following relevant system changes.

2.3 Governor Droop Demanded Response

TSO Initial Proposal:

Retain the existing calculation of Governor Droop demanded response.

TSO Decision:

Implement TSO initial proposal as described above.

2.4 Use of Failure to Synchronise Data

TSO Initial Proposal:

Continue assessing ramping services based on the Fail Sync process for the duration of the Interim Arrangements, for all providing units which are not DSUs.

TSO Decision:

Implement TSO initial proposal as described above.

2.5 Binary Nature of a Pass Fail Assessments

TSO Initial Proposals:

1. Introduce partial fails for achieved performance to an Event within 70% to 90% of expected for Reserve events.
2. Continue with binary (1/0) Pass / Fail assessments for ramping services.

TSO Decision:

Implement TSO initial proposal as described above.

2.6 Performance Scalar Calculation Methodology

TSO Initial Proposals:

Revise the existing Performance Scalar calculation methodology by introducing two aspects to assessment of performance;

- The monthly Performance Scaling Factor (K) which calculates a scaling factor based on the average performance to events which occur within a given month
- The Dynamic Time Scaling Factor (V) which scales the impact of the monthly Performance Scaling Factor based on the time difference between the month the current assessment month for calculating the DS3 Performance Scalar is calculated for and the month in which the monthly Performance Scaling Factor (K) relates to. This effectively weights the importance of more recent events on the units Performance Scalar.

Within this the unit's performance scalar is calculated as one minus the products of K and V for all applicable months up to a maximum of 5 months.

Full details of the proposal are described in the consultation paper referred to in this decision paper and are included in the accompanying DS3 Protocol document.

TSO Decision:

Implement TSO initial proposal as described above.

2.7 Data Poor Resolution and Performance Testing

TSO Initial Proposals:

The TSO proposed that following a sustained period of time with no assessable performance event then a Providing Units DS3 performance scalar will begin to reduce overtime. This was proposed to decrease piecewise in two steps, decreasing from 1 to 0.7 over the period of 8 to 16 months without an available assessable event and then more rapidly from 0.7 to 0 between months 16 to 24 months.

In order to reset the Performance Scalar to 1, a Service Provider has two options;

- a) The Service Provider can wait for an Event where they can be assessed against. Following this assessment the unit will revert back to main assessment mechanism.
- b) The Service Provider can apply to enter into the performance testing process. Upon receipt of an application the TSO will then detail the exact testing requirements to be undertaken and agree timelines with the service provider. Upon completion of said test the performance scalar can then revert back to 1.

TSO Decision:

The TSO have modified the proposed approach to include a number of mitigations to limit the amount and costs associated with testing as well as provide more clarity on the process. These include;

- a) Increasing the entry point into this data poor scalar calculation from 8 months to 12 months
- b) Utilisation of historical evidence of performance in line with current plant running regimes (including response to smaller frequency disturbances and previous test results if relevant)
- c) When did the last assessable Event occur for all units in general
- d) How often is the unit available to provide the service

Depending on each Providing Units circumstances in relation to the above criteria only then must then enter into the performance testing process. Within this process, it is still proposed that each test should be specified and agreed on a case by case basis with the Service Provider and the testing teams within EirGrid and SONI. Care will be taken when scheduling a test however to try accommodate in line with other tests which may be required by that unit more generally and minimise the amount of testing required as much as possible.

Overview of the Revised Process:

Service Providers will now enter into the revised data poor methodology following a period of 12 months without any assessable events. From here similarly to what was proposed originally the Performance Scalar will begin to tend towards zero over a period of 3 years, with the scalar reducing from 1 to 0.7 over the period of 12 – 30 months and more rapidly from 0.7 to 0 between 30 to 48 months as described below;

Table 3: Data Poor Configuration

Months without an event (M)	Performance Scalar Calculation (P)
< 12 Months (M)	$\text{MAX}(1 - \text{SUM}(\text{Km} * \text{Vm}), 0)$
$12 \leq \text{Months (M)} < 30$	$0.7 + ((30 - M) * (0.3/18))$
$30 \leq \text{Months (M)} < 48$	$(48 - M) * (0.7/18)$
>48 Months (M)	0

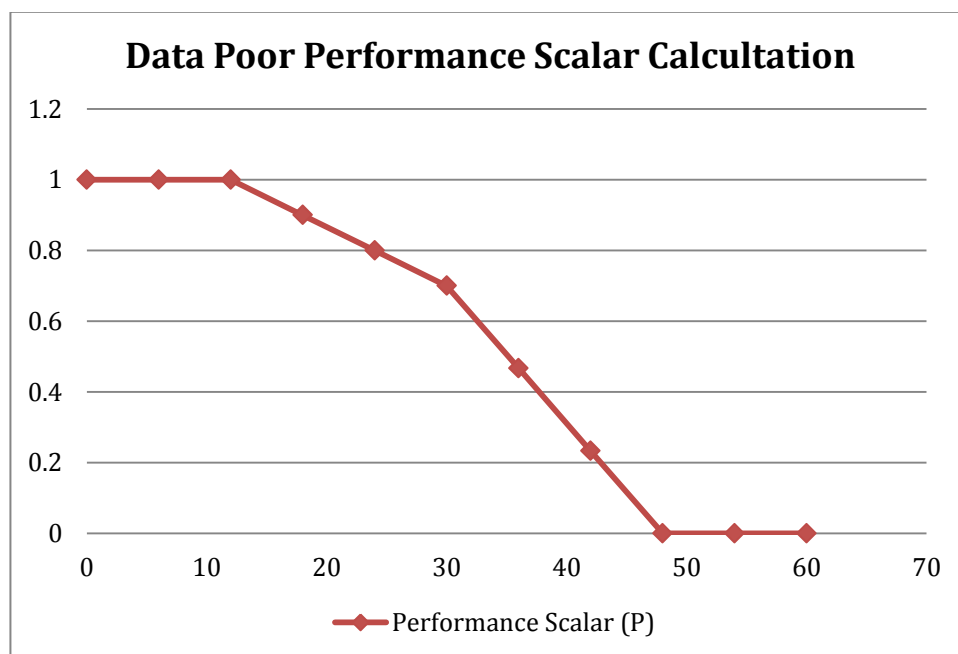


Figure 1: Graphical Representation of Performance Scaling using the Data Poor Scalar Calculation

In addition to the revised timelines and Performance Scalar calculations shown in Table 3: Data Poor Configuration and Figure 1: Graphical Representation of Performance Scaling using the Data Poor Scalar Calculation more consideration was given to the testing process itself to account for much of the feedback received through the consultation including;

- Utilisation of historical evidence of performance in line with current plant running regimes (including response to smaller frequency disturbances and previous test results)
- Accounting for if no assessable Event occurred for industry over the minimum timeframe.

A high level Visio diagram of the proposed process can be seen in Figure 2: High Level Performance Scalar Data Poor Categorisation Assessment below. Further details on the process are available in the accompanying DS3 protocol document.

Data Poor Performance Scalar High Level Business Process

Time Since Event
<12 Months 12 Months > 12 Months

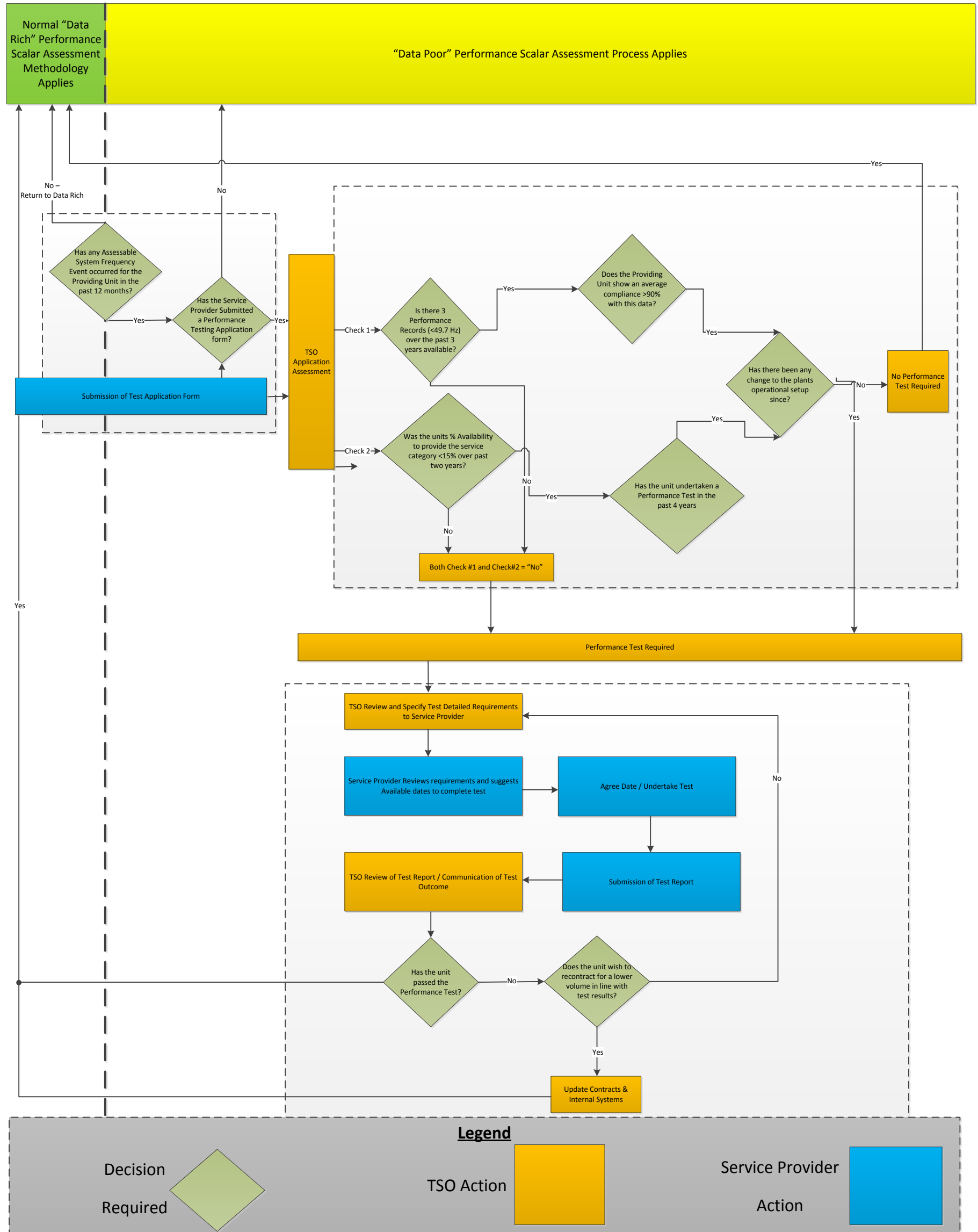


Figure 2: High Level Performance Scalar Data Poor Categorisation Assessment

Following TSO specification of test requirements an earliest available date to conduct the test will be proposed by the TSO. Should the Service Provider prefer to choose an alternative date greater than 1 calendar month from this date to align with other testing required by the Providing Unit or based on their availability then the Data Poor Performance Scalar will continue to decrease during this time difference.

In general, if the Performance Testing process is awaiting actions from the Service Provider (shown in blue in Figure 2 above) then the Data Poor Performance Scalar will continue to deteriorate. If the process is delayed due to constraints by the TSO then the Data Poor Performance Scalar will remain as is during this time period.

2.8 Business Process

TSO Initial Proposals:

The TSO proposed to retain the existing business process and timelines in use to date but also to include details on these in the revised DS3 system services protocol document.

TSO Decision:

Implement TSO initial proposal as described above. Details are published in the accompanying DS3 Protocol document.

3 Detailed Responses to Consultation

3.1 Consultation Process

In April 2017, EirGrid and SONI published a consultation paper on the Interim Arrangements Revised Performance Scalar Calculation Methodologies. The consultation paper sought stakeholder feedback on proposals to change a number of aspects of the current methodology including;

- The Pass / Fail assessments undertaken;
- The calculation of Performance Scalar values;
- The role of Performance Testing and its applicability to data poor scenarios; and
- The associated business process.

The consultation paper posed the following consultation questions to structure responses around:

- **Question 1:** Do you agree with the TSOs' proposal to award a Pass when a unit's achieved response is greater than the initial expected response (ignoring tolerances) in cases where the overall expected values is less than 0 MW?
- **Question 2:** Do you agree with the TSOs proposal to utilise a time weighted average approach for the calculation of SOR and TOR1?
- **Question 3:** Do you agree with the TSOs' proposal to retain the existing calculation of Governor Droop demanded response?
- **Question 4:** Do you agree with the TSOs proposal to continue assessing ramping services based on the Fail Sync process for the duration of the Interim Arrangements, for all providing units which are not DSUs?
- **Question 5:** Do you agree with the TSOs' proposal to introduce partial fails for performance between 70% to 90% of that expected for reserve events?
- **Question 6:** Do you agree with the TSOs' proposed new Performance Scalar methodology?
- **Question 7:** Do you agree with the TSOs' proposed new Data Poor resolution methodology?
- **Question 8:** Do you have any feedback on the type of tests to be undertaken

through the performance testing process?

- **Question 9:** Do you agree with the proposal to retain the existing business process and timelines?

3.2 Responses to the Consultation

The consultation period concluded on 10th May 2017 with 10 response received in total. None of the responses received were marked as confidential. Responses were received from the following stakeholders;

- AES
- BGE
- Bord na Móna
- Energia
- ESB GWM
- Moyle Interconnector Ltd
- Power NI PPB
- Schwundgrad Energie Ltd
- SSE
- EnerNOC

The views of respondents have been summarised and addressed in the narrative below. A number of respondents provided a more specific reply, often reflecting the respondents' particular circumstances or technology. In keeping with previous System Service consultation papers, all responses that were not marked as confidential will be published by the TSOs.

Overall, there was broad agreement amongst the majority of respondents that the proposed revisions were reasonable and better reflected the concerns raised to date. Of the feedback received the areas where respondents voiced the most concern were;

1. The Use of Fail Sync data for assessing ramping services until such time as a fully automated system accounting for all dispatch instructions can be implemented.

2. The application of the data poor performance scalar following 8 months without an assessable performance event was deemed to be too short given the frequency of occurrence of sub 49.5 Hz events. Additionally, it was noted the costs of carrying out tests would put additional strain on service providers revenue streams, in particular those with limited revenues from System Services already as they are not in scheduled frequently enough to provide the service. A number of providers suggested that the TSO should be liable for any costs associated with partaking in performance tests.

Full details on the responses received are outlined in the sections below.

A number of respondents also replied with comments outside of the scope of this consultation. These related to:

- Tariff rates for DS3 System Services and investor certainty;
- Settlement Timelines; and
- TSO incentive structures for procuring and scheduling of services in an efficient manner.

3.3 Responses to Reserve: Use of N/A when Tolerances Exceed Expected Value

The TSO proposal on this was to award a Pass when a unit's achieved response is greater than the initial expected response (ignoring tolerances) in cases where the overall expected values is less than 0 MW.

Of the 10 responses received on the proposal, 8 respondents were in favour of the change with 2 opposed. A number of respondents noted their preference would be to add tolerances to a units achieved response as opposed to netting off expected but acknowledged the TSO proposal was a step in the right direction.

One respondent noted that a pass should be awarded when the achieved response is greater than or equal to the initial expected response. The TSO agree that in such circumstances a pass record should also be awarded.

It was also pointed out by one respondent that although they believe the pass / fail tolerances of 10% or 1 MW should be netted off of a units expected response, the

inclusion of the POR inertia credit should in fact be added to a units achieved response. The context of why the inertial credit is applied by the TSO is to account for the fact synchronous providers give a larger response in the sub five second time frame should the frequency nadir occur before 5 seconds and are subsequently recovering some of this inertia response at the 5 second point when POR is assessed, whilst there is a positive Rate of Change of Frequency (RoCoF) occurring. The TSO has considered this further including a review of background documentation from the Joint Grid Code Working Group through which the POR inertia credit modification was assessed and are happy that the intent has always been to net the credit off the units expected response. It is the TSOs position that the achieved response recorded should always be represented as Megawatts (MW) exported to the grid at the point of connection and any tolerances or credits to be applied should be accounted for as part of a units expected response.

In summary, the TSO now propose the award a Pass when a unit's achieved response is greater than or equal to the initial expected response (ignoring tolerances) in cases where the overall expected values is less than 0 MW. The tolerances of the lesser of 10% / 1 MW and the POR inertia credit will remain netted off a units expected response.

3.4 Responses to Calculation of Achieved SOR and TOR1

The TSO proposed to utilise a time weighted average approach for the calculation of the Achieved SOR and TOR1 response as opposed to the current average deficit approach. All 10 responses received were in favour of this proposal with a number of respondents noting that this better represents how the system frequency profile is changing in response to events in recent years.

In addition to the change a number of service providers stressed the need to implement the change sooner rather than later and requested the TSO make a clear commitment to when this change can be implemented. In respect of this the TSO appreciate the drive from industry to change the performance methodologies sooner rather than later. However, it is also important to realise that this change is proposed to be implemented at a time when important work relating to Regulated Arrangements procurement and contracts will be ongoing. Additionally, these changes need to be considered in line with the launch of the Enhanced Performance Monitoring System which is currently due to launch towards the end of 2017. Any changes to current tools or systems also need to

be reflected in this system. Therefore, it remains the intent of the TSO to implement the proposed changes to calculation of SOR / TOR1 around Q4 2017. However, should other work items take priority or the Enhanced Performance Monitoring System is not delivered in line with current projections then the TSO do not believe it is appropriate to go live with the proposed changes until such time as systems are ready to implement the changes into the business.

Two respondents requested that SOR / TOR1 should be resettled for the Interim Arrangements upon implementation of the proposed changes. The TSO do not believe this approach to be appropriate as the Performance Scalars calculated would have been in line with the methodology outlined in the Protocol document at the time of assessment. However, the TSO will consider reviewing applicable sub 49.5 Hz events over the previous 5 months following the implementation of the new approach. The specifics of this will be assessed during the implementation phase of this change.

One respondent stated that this proposal should also apply to the assessment of POR. The TSO currently do not plan to revise the methodology for assessing POR from what is described in the current protocol document but will consider this position further for future regulated arrangements set to go live from May 2018.

3.5 Responses to Governor Droop Demanded Response

9 responses were received to the proposal to retain the existing calculation of Pre Event Frequency used in the assessment of the Governor Droop demanded response. 7 of these responses were in favour of the proposal with 2 opposed.

Of the two opposed, one noted that the lack of applicability (i.e. lack of events this applies to and regardless of the introduction of partial fails to reduce the impact of this assumption) should not be deemed as a reason to not move to a more optimal assessment method. In response to this the TSO would like to clarify that it does not support the position that the lesser of 50Hz or the pre event frequency is a more optimal solution, rather it is a move favourable position for industry. Additionally, it noted the main reason why this has become a point of focus in recent months was due to the binary nature of the pass – fail assessment approach which we are proposing to move to a sliding scale assessment going forward.

Three respondents also mentioned the Pre Event timeframe from which the assessment is carried out over in their response as an area which needs to be considered going forward as the frequency is likely to shift more severely as the system becomes lighter. This is currently defined as 30 to 60 seconds prior to the event. The TSO note this time frame for further as part of regulated arrangements but do not propose a change at this time. The reasoning for this are multiple;

- the current Pre Event timeframe has been agreed and implemented with industry for a number of years,
- changes to this timeframe could have either a positive or negative effect on a units calculated response (depending on the nature of the frequency prior to the event),
- the Pre Event timeframe was not included as a specific question in the initial consultation paper and therefore other respondents have not had the chance to comment on the validity of these parameters,
- further analysis will be required to develop the TSOs position on the validity of the pre event timeframe which should also be considered in line with likely new technologies providing reserve services in future years such as DSM or Wind.

One respondent noted that the calculation of the pre event frequency and megawatt output is heavily dependent on the pre event time frame chosen and the most appropriate time can be different for each event. In respect of this it was noted that more flexibility should be allowed to adjust the pre event time during unusual events. The TSO accepts with the context that the most favourable pre event time is different for each event. However, it is also important that there is a pre-defined standard which can be agreed and applied to ensure transparency of the assessment methodology. In cases where unusual system conditions appear pre event the service provider does have the opportunity to query the performance assessment outcome, following which the TSO may make the decision to overturn their original decision depending on the results and data presented.

3.6 Responses to Use of Fail Sync Data

In respect to the application of Fail Sync data as a proxy in the interim period, the TSO proposed to retain the existing method until such time as a more comprehensive automated method can be developed accounting for real-time running parameters, Technical Offer Data (TOD) and dispatch instructions issued. 8 responses were received

in response to this with 5 in favour and 3 opposed. Of the 5 in favour there was a general acknowledgement that the current methodology was appropriate as an interim measure but stressed that the move towards a more detailed approach against all dispatch instructions should occur sooner rather than later.

One respondent noted that there has been a number of resettlements required for the ramping services since go live in October and any additional changes to systems, calculation methodologies associated with these should not be carried out in the short term.

One respondent stated that they do not agree with the use of Fail Sync data as it does not reflect the units' performance once they are online and stated that no performance scalar should be applied for the Interim Arrangements. The TSO does not support this position. Synchronisation instructions are a subset of a units overall ramping performance and therefore considered to be a reasonable approximation for industry performance in general.

No alternatives were proposed as a readily available assessment methodology to the use of Fail Sync data during the Interim Arrangements.

3.7 Responses to Introduction of Partial Fails

The proposal to introduce partial fails for achieving between 70% to 90% of a Providing Units expected response for the performance assessments of Reserve products was widely welcomed by respondents with all 10 respondents in favour of this approach.

A number of providers questioned the 70% to 90% thresholds and requested more information be provided in respect to how these values were obtained. A number of respondents noted this lower threshold should be 60% or 50% respectively but provided no supporting evidence as to why they believe this to be the case. One respondent agreed with the parameters in principle but stated that these should be considered going forward and adjusted once the impacts of the revised methodologies are better understood following go live of the changes.

The lower limit of 70% for partial fails was taken following a comparison of historical system reserve expected and achieved. This assessment summated all the system

reserve expected and achieved over the past two and showed that on average the achieved response at a system level was 116% of what was expected. Given this the TSO felt comfortable to allow partial fails down by 20% from the existing threshold of 90%. It is important to note also the context of these partial fails are such that the TSO believe good performance should be considered above and beyond the upper threshold of 90% and the introduction of partial fails are primarily to account for the lack of event data available to carry out more frequent assessments.

One respondent requested the terminology of a “Partial Fail” should be changed to a “Partial Pass” to better reflect the fact the unit has provided a meaningful response to an event. The TSO are happy to facilitate adjusting the wording of this for use in the revised DS3 System Services protocol document.

One respondent noted a typo on page 15 of the consultation paper which read *“It should be noted here that the scaling value of a passes and fails have switched meaning from the current performance scalar methodologies so that a Pass is now awarded as a 0 and a Fail is awarded as a zero”* The TSO wish to clarify this text should have read *“It should be noted here that the scaling value of a passes and fails have switched meaning from the current performance scalar methodologies so that a Pass is now awarded as a 0 and a Fail is awarded as a 1”*

3.8 Responses to Revised Scalar Methodology

Responses to the revised DS3 performance scalar calculation methodology were largely positive with 7 respondents in favour of the proposed changes and 3 opposed.

Of those opposed one respondent suggested the calculation should take the average of the product of the monthly Performance Scaling Factor (K_m) and Dynamic Time Scaling Factor (V_m) such that the performance scalar P would be calculated as;

$$P = 1 - \text{MAX} (\text{AVG} (K_m * V_m), 0)$$

The TSO do not believe this approach provides enough incentive for providing units to perform particularly where events are not frequent as the Providing Units average would be tending towards 1 in these months due to no events occurring. Additionally, the use of the Dynamic Time Scaling Element additionally would tend this towards 1 unless Providing Units are failing Events on a monthly basis. As a result the TSO do not intend to implement this proposal.

One respondent believed the proposal to be more penal than the existing methodology, as one significant fail could result in a loss of revenue for up to 5 months following an event whereas the prior method allowed for one fail over the past 10 events. The TSO note the impact one single event could have on a unit's performance scalar in the preceding months following that event will now increase. However, the previous methodology was deemed to not be dynamic enough to rectify the scalar back to one following good performance. In order for the scalar to be more dynamic it therefore needs to be able to respond more significantly in response to new performance data, both positively and negatively. The TSO are satisfied that the proposal achieves this objective.

One respondent noted the use of High Frequency response data could be used to overcome the lack of data. High frequency response is required by a number of providing units under grid code but system services reserve products focus primarily on underfrequency events. The concept of applying event data from over frequency events is an interesting concept. However, it is not proposed to assess these types of events currently for assessment of reserve services under System Services.

One respondent requested clarification on the equation used to calculate the Event Scaling Factor 'Q_i' as seen in Equation 3, Page 16 of the decision paper noting that the formula only works if S is assumed to be a percentage. The TSO confirms that this was in fact the case and for clarity wishes to confirm the calculation of the Event Performance Scalar 'S' should read as per the below when 'S' is not a percentage value;

Equation 2: Calculation of Event Scaling Factor 'Q' for Reserve

$$\begin{aligned} \text{If } S \geq 0.9, Q_i &= 0, \\ \text{If } S \leq 0.7, Q_i &= 1, \\ \text{Otherwise, } Q_i &= (0.9 - S) \times 5. \end{aligned}$$

The context of this formula is such that it allows for partial passes whereby a unit achieves between 70% 90% of its expected response as seen in Figure 3 below.

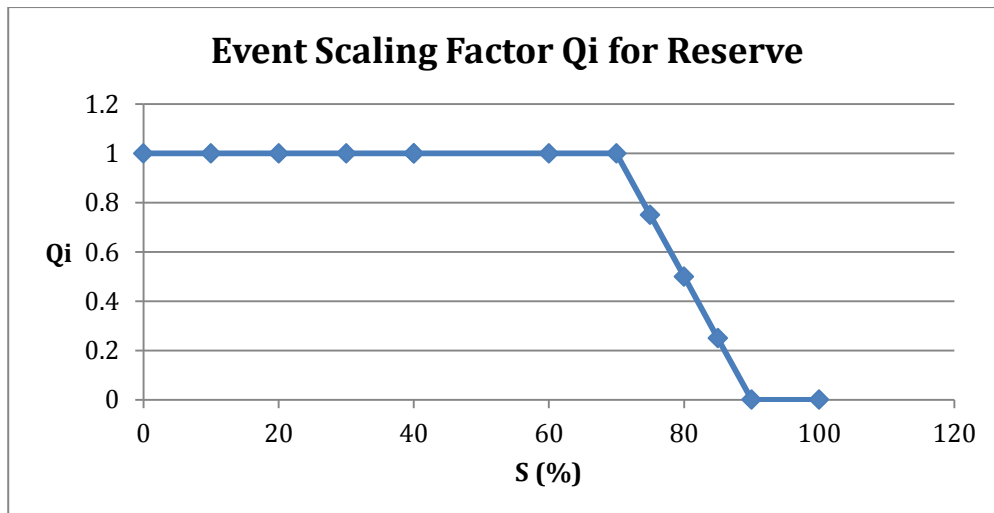


Figure 3: Graphical Representation of Reserve Partial Passes

3.9 Responses to Data Poor Resolution

The data poor mechanism whereby in the absence of any event data a unit's performance scalar begins to tend towards zero over a 24 month window was one of the more contentious aspects of the consultation paper. 9 responses were received in response to the question with 5 in favour of the proposal and 4 opposed.

All responses received provided comments on the current proposal. These can be categorised into two areas for consideration;

1. Feedback on the Performance Testing process
2. Feedback on the costs associated with Testing

In respect to the Performance Testing Process respondents provided the following feedback;

- The 8 month point which begins the reduction of the Performance Scalar is too short and 2-3 years would be more appropriate
- The method doesn't account for should the case arise where no event occurs across all units over an 8 month window
- On reaching the 8 month limit the unit should revert to an industry average as opposed to a depleting scalar over time
- The approach should account for units who get very little reserve running time but historically have shown good performance whenever they are called upon.

Based on the feedback received and further discussion internally with our testing and compliance teams and the Regulatory Authorities more detail on the process has been

developed to account for much of this feedback received. Details of this process are described in Section 2.7 as well as the revised DS3 Protocol Document.

The second category of responses focused on the cost of undertaking performance testing with many providers stating the costs for testing should be borne by the TSO. The TSO do not propose to cover the costs of partaking in any system tests and believe this cost should be covered through the service providers DS3 System Services revenues. However, the TSO do acknowledge the cost of testing is a concern and will try to ensure costs are minimised as much as possible throughout the process. Some high conceptual details on this are given in Section 2.7 and Section 3.10 below.

3.10 Responses to Performance Testing

Following on from the feedback raised under Section 3.9 above, respondents were offered the opportunity to input on what they believe should constitute a performance test.

Most respondents chose to focus on the testing tariffs that should be applied for completing performance tests, rather than provide alternative mechanisms to demonstrate performance for units with limited to no data showing their response to real system events.

One respondent noted that performance tests should differentiate from the full suite of tests being carried out currently under Grid Code and should focus solely on the specific services the unit is required to demonstrate performance upon. The TSO agree with this in principle. Although the exact test requirements will be agreed on a case by case basis, the TSO will aim to minimise impacts on providers as much as reasonably possible whilst still being able to prudently justify reliance on service providers who have not demonstrated their performance in a long period of time. Ways in which this can be achieved are by looking at other data such as follows;

- When did the last sub 49.5 Hz event occur,
- Assessment of historical system events up to 49.7 Hz over the past number of years (assuming no change to plant set up occurred over said time frame),
- Has there been any similar testing partaken due to Grid Code or other which could be used to verify performance, and
- How often is the unit available to provide the service.

If having assessed the options above the TSO still believes a test to be warranted then the specifics of said test will be agreed with the Service Provider and will aim to keep any impacts on cost or the system to a minimum. Ways in which this can be achieved are as follows;

- Focusing solely on a subset of tests which represent the specific services the Providing Unit is considered data poor upon
- Aligning Performance Test schedules with other scheduled tests required due to Grid Code obligations or other where possible.

3.11 Responses to Business Process

6 responses were received on the existing business process for Performance Scalar assessments with 4 respondents in agreement with the existing process and 2 opposed.

One respondent stated the timeline to respond to the Performance Scalar data packs of 10 working days is too short and providers should be allowed to submit queries up to 1 year following an event. The TSO would like to clarify the timeline of 10 working days is associated with the Performance Scalars which apply to the next assessment month solely. Service Providers can query the outcome of a performance event at any time up to 1 year; however following assessment of the query any changes to the outcome of the performance record will only be applied going forward with the data record set as N/A whilst the query is under assessment.

It was also noted that the protocol should include details on TSO SLAs in respect to responding to queries. The TSO will look to give guidance on average timelines in respect to query resolution. However, the TSO does not consider it appropriate to commit to any minimum SLAs due to the nature of queries raised as this is heavily dependent on the nature of the query itself. Additionally, as the data record remains set to N/A whilst the query is being resolved there is no major impact of the assessment timeline for the service provider.

One respondent noted it would be useful to publish some detail on the types of queries received to date and what the TSO would consider to be a valid query which has been overturned to ensure service providers are not constantly resubmitting the same types of query. The TSO supports this idea and will look to put something in place along these

lines going forward. However, this is not something that should be captured in a protocol document and therefore not within the scope of this consultation.

3.12 Other Issues raised by respondents

A number of other issues outside of the scope of this consultation were also raised.

These are split into two categories and summarised below;

1. Other Issues relevant to Performance Monitoring
2. Other Issues not relevant to Performance Monitoring

A list of comment or issues raised relevant to performance monitoring but not directly covered within this consultation are as follows;

- The DS3 System Services Protocol Document should be consulted on again for April 2018 contracts
- The governance of the Protocol document should only allow changes to be implemented on a yearly basis
- The method of calculation of the Pre Event Time for Reserve services
- The use of a performance scalar provides significant risk to investors
- The omission of DSUs from the Ramping Instruction process (for clarity DSUs receive Sync Instructions. However, they cannot fail a sync instruction based on the current assessment methodology. Hence, a separate approach has been developed for assessing their ramping capabilities)
- Publication of query outcomes and FAQs

A list of comment or issues raised not relevant to performance monitoring and not directly covered within this consultation are as follows;

- TSO incentive mechanisms should be developed to ensure efficient contracting and scheduling of reserve and ramping services
- Timelines associated with Settlement are deemed to be too long
- The publication of indicative future tariffs and price certainty required for investment
- Changes to the current DS3 Protocol document should be superseded by the opportunity to recontract for volumes post implementation
- The application of Performance Scalars should be more accurately reflected in assumptions on tariff rates.