

Consultation on DS3 System Services Interim Tariffs

DS3 System Services Implementation Project

8 April 2016



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Synopsis

Context

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.

We published the results of the “*Facilitation of Renewables*” studies in 2010. This work identified the fundamental challenges in meeting these responsibilities. These challenges were represented by a metric called “*System Non-Synchronous Penetration*” (SNSP). This metric indicates the ability to operate the power system safely, securely and efficiently with high levels of renewable generation. A higher percentage indicates that a greater amount of electricity demand can be supplied by wind and solar generation.

The studies identified that in order to meet the public policy objectives effectively and efficiently, the TSOs would need to be capable of operating the system at up to 75% SNSP. The studies 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.

Our response to these challenges was the “*Delivering a Secure Sustainable Electricity System*” (DS3) programme. This is a multi-year, multi-stakeholder programme. It had 11 work streams, one of which was the development and implementation of a new approach to incentivising performance from generators and other connected parties.

The System Services¹ work stream was initiated to ensure appropriate system services would be available to meet the needs of the system with the renewable generation portfolio expected by 2020. Our investigations have shown that in addition to the existing seven ancillary services, we will need seven new additional services to maintain system stability and security. The collection of these 14 services is known as “*DS3 system services*” or “*DS3 services*”. The need for these new services has been consulted on and the SEM Committee has determined that:

- they are appropriate²;
- these DS3 services should be procured through competitive auction, where possible³;
- the new DS3 System Services arrangements should be delivered in two phases, an interim phase and an enduring phase.

¹ System Services, also called Ancillary Services, are products other than energy that are necessary for the safe, secure and reliable operation of the power system.

² DS3 System Services Technical Definitions - Decision Paper:

<http://www.allislandproject.org/GetAttachment.aspx?id=28a87af5-6de5-42f4-8673-2dee3400e949>

³ 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>

The interim phase will cover the period between 1 October 2016 and 30 September 2017 and will procure the DS3 system services using regulated tariffs. This means that service providers will be paid at a tariff rate, approved by the Regulatory Authorities, for the volume of services they are available to deliver in each trading period. We will contract with all eligible service providers for 11 of the 14 services. For the other three services, namely Fast Frequency Response (FFR), Fast Post-Fault Active Power Recovery (FPFAPR) and Dynamic Reactive Response (DRR), we propose to use technology trials during the interim phase to assess the measurability approach to these “fast” services. We will therefore only contract with a subset of eligible providers for these three services.

The enduring arrangements, which will begin on 1 October 2017, will deliver competitive procurement using auctions, where appropriate, for the 14 services. Where there is insufficient competition, a tariff will be applied. The SEM Committee has decided that these enduring regulated tariffs should be set using a “cost-plus” methodology based on a Best New Entrant (BNE) methodology (or similar). The regulated tariff methodology to be used in the enduring arrangements has been consulted on previously and is not the subject of this paper⁴.

This paper outlines the interim tariff rates that we are proposing to pay for DS3 services over the interim period. This paper sets out how we have calculated these rates, which are consistent with the TSO DS3 System Services principles⁵ and SEM Committee DS3 System Services decisions, where relevant. We are seeking the views of stakeholders on the approach proposed, including the resulting rates.

Potential service providers will be required to detail their ability to deliver the DS3 services through a procurement exercise which will be the subject of further stakeholder engagement in the coming weeks.

Benefits of the Interim Arrangements

The interim arrangements are designed to:

- provide for the needed services to maintain a secure, reliable power system in 2016/2017;
- transition from the existing Harmonised Ancillary Services (HAS) arrangements to the DS3 System Services enduring arrangements while:
 - validating the capability of service providers to deliver the DS3 system services in a robust and reliable manner;
 - proving the capability, and establishing the measurability, of relevant new technologies to provide a limited subset of DS3 system services. This will

⁴ We held a separate consultation in November/December 2015 on the regulated tariff calculation methodology for the enduring arrangements – the consultation paper can be viewed [here](#) and the accompanying Pöyry report can be viewed [here](#). There will be further stakeholder engagement on the methodology and on the resulting tariffs during 2016.

⁵ DS3 System Services TSO Recommendations Report to the SEM Committee – see [here](#)

prudently increase the competitive forces prevalent in the enduring DS3 System Services arrangements;

- establish the processes and procedures that will provide the backbone of the enduring arrangements;
- provide cost-effective payments consistent with the transition from HAS to the enduring arrangements, which will ultimately lead to efficient investment in the capability required on the all-island transmission system;
- deliver direct cost savings to end users arising as a result of lower capacity payments and potential increases in operational SNSP.

The learning that the TSOs and service providers can obtain through the interim arrangements will also deliver indirect benefits for customers. These will include more informed bidding by service providers into the DS3 System Services and I-SEM Capacity Remuneration Mechanism (CRM) auctions in 2017 (potentially reducing costs into the future), testing of the commercial arrangements in advance of entering into long term contracts, and validation of settlement systems.

Transition to New Technologies

We are required to procure system services in an efficient manner. Given the increasing reliance on system services, we are of the opinion that these should only be paid for where delivery and quality of performance can be measured. We therefore need to establish reliable methods for measuring quality of service provision for all 14 services.

We have been able to build confidence in traditional power system technologies with many years of proven experience. The large scale deployment of new technologies through the DS3 System Services enduring arrangements is intended to reduce total costs and facilitate the delivery of public policy objectives. However, we will need to be confident that this deployment will not inadvertently undermine the resilience and security of the power system. As TSOs, we have a duty to maintain system stability and avoid loss of supply. We therefore need to take steps to identify the associated risks, obtain information about the capability of new types of service provider and manage this transition in a prudent fashion.

The interim arrangements provide an ideal opportunity to establish the mechanisms by which the characteristics of new technologies can become “Proven” and “Measureable” for the widest range of non-energy system service provision possible. We propose to use technology trials to provide potential providers with an opportunity to demonstrate the capabilities of technologies that have not previously delivered system services on a system with similar characteristics to that of the all-island system which we operate⁶.

We will also need to be able to measure the quality of provision of “fast” services i.e. Fast Frequency Response (FFR), Fast Post-Fault Active Power Recovery (FPFAPR)

⁶ Note: this could include aspects such as the size of the synchronous system, the generation portfolio and the SNSP levels among other technical parameters.

and Dynamic Reactive Response (DRR). We propose to explore this during the interim phase using technology trials.

Further information on the proposed technology trials will be provided at a DS3 System Services Industry Forum scheduled for 11 April 2016 in Dundalk. We also plan to publish a paper following the workshop that will outline our proposals for how the first set of trials will work as well as how we envisage the arrangements working on an enduring basis.

The interim rates, combined with an appropriate procurement strategy, should provide the opportunity for a range of new technologies to prove their ability to provide DS3 services. New service providers will increase the amount of competition in the system services market, and these interim arrangements will facilitate capturing the benefit of increased competition within the first auction in 2017.

Payment Rate Calculation Methodology

We used three main inputs to calculate the payment rates for the interim phase:

- Plexos production cost modelling;
- A review of the TSOs' DS3 System Services relative valuation methodology;⁸ and
- The SEM Committee DS3 System Services procurement design decision.⁹

We used a Plexos model based on the 2015/16 Dispatch Balancing Cost (DBC) model, which we use for constraint cost forecasting. When running this model, we made a range of assumptions including but not limited to fuel prices, service provider characteristics and interconnector flows.

We ran the Plexos model for the full year (8760 hours) and used the results to estimate an approximate volume of each DS3 service provided by providers that we anticipate will be eligible for payment under the new interim arrangements. These volumes were calculated based on the “availability” payment rules, as set out by the SEM Committee.

We assessed the relative importance of each service to us over the interim period. When doing this, we took into account:

- the contribution each service would make towards supporting the step to 60% SNSP;
- the status of other DS3 work streams (e.g. RoCoF and Performance Monitoring);
- the importance of the current services; and
- the importance of the services when operating the system with 75% SNSP.

This assessment provided relative weightings for the 14 services for the interim period, and included a reassessment of the relative importance of the current services.

To determine the rates, we started with a notional total “pot” size. This “pot” was designed to ensure that the total payment for the seven existing services in 2016/17 at

⁸ DS3 System Services TSO Recommendations Report to the SEM Committee – see [here](#)

⁹ 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>

least equals the existing budget for these services when the “pot” is allocated according to the proposed 2016/17 relative weightings (see Table 3 in Section 2 for more information on the proposed 2016/17 relative weightings). We then calculated the pots for each individual service using these relative DS3 service weightings. From these relative weightings we calculated the interim tariffs by dividing each individual “pot” by the estimated annual DS3 service remuneration volume. The proposed interim tariff rates are shown in Table 1.

Based on this approach, the rates proposed would potentially increase the total payments for system services to existing providers by approximately €20m. However based on the interaction with the CPM and the associated Best New Entrant calculation this is likely to reduce the SEM capacity pot by a similar amount.

Table 1: Proposed Interim Tariff Rates for 2016-2017

Service Name	Unit of Payment	Proposed Rate €
Synchronous Inertial Response (SIR)	MWs ² h	0.004
Fast Frequency Response (FFR)	MWh	1.96
Primary Operating Reserve (POR)	MWh	2.47
Secondary Operating Reserve (SOR)	MWh	1.37
Tertiary Operating Reserve (TOR1)	MWh	1.19
Tertiary Operating Reserve (TOR2)	MWh	0.99
Replacement Reserve – Synchronised (RRS)	MWh	0.13
Replacement Reserve – Desynchronised (RRD)	MWh	0.64
Ramping Margin 1 (RM1)	MWh	0.08
Ramping Margin 3 (RM3)	MWh	0.13
Ramping Margin 8 (RM8)	MWh	0.10
Fast Post Fault Active Power Recovery (FPFAPR)	MWh	0.13
Steady State Reactive Power (SSRP)	MVArh	0.20
Dynamic Reactive Response (DRR)	MWh	0.03

The proposed Interim Tariff payment rates have been initially calculated in Euros. In determining the associated sterling rates, we propose to apply the same methodology for the interim arrangements as has been used for the Harmonised Ancillary Services (HAS) arrangements. This methodology is consistent with that applied under the Trading and Settlement Code for the calculation of the annual capacity exchange rate i.e. the average of the forwards rates for the forthcoming year as taken over a period of 5 days prior to tariff and payment setting.

Impacts on end users

The amount that will be paid out through technology trials to service providers using new unproven technology or to assess the options for measuring the performance of “fast” services is currently uncertain. However as we intend to limit the amount that we rely on

these new providers/services, until their characteristics are demonstrated, we do not expect the payments for these trials to exceed €3m¹⁰ over the 2016/17 tariff year.

End user tariffs are unlikely to be materially impacted by the introduction of the new system services; however there will be an increase in SSS in NI and TUoS in Ireland, which should be offset by a reduction in the SEM capacity pot¹¹ (based on the current methodology). The learning obtained by both the TSOs and service providers through these interim arrangements should deliver benefits in subsequent years. The proposed payment rates also have the effect of rebalancing income towards service providers that provide greater value for consumers.

These payment rates will only apply for the interim period. The Regulatory Authorities and TSOs are undertaking separate analyses and consultations to determine the regulated tariffs that will apply under the enduring arrangements.

Next Steps

Views and comments are invited on all aspects of this document. Responses to the consultation should be submitted to:

DS3@soni.ltd.uk and DS3@EirGrid.com by 20 May 2016.

Responses should be provided using the associated questionnaire template. It would be helpful if answers to the questions include justification and explanation. If there are pertinent issues that are not addressed in the questionnaire, these can be addressed at the end of the response.

It would be helpful if responses are not confidential. If you require your response to remain confidential, you should clearly state this on the coversheet of the response. We intend to publish all non-confidential responses. Please note that, in any event, all responses will be shared with the Regulatory Authorities to inform their approval of the final payment rates.

To facilitate stakeholder engagement we will host an industry workshop during the consultation period. This workshop, which is scheduled for 11 April 2016 in Dundalk, will provide an opportunity for discussion on the details of the consultation paper. The workshop will also focus on all other core aspects of the interim arrangements (e.g. contracts, procurement, technology trials, settlement etc.). Should you wish to register, please contact DS3@soni.ltd.uk or DS3@EirGrid.com

¹⁰ This is less than 10% of the expected payments to proven providers, reflecting the need to incorporate the new technologies on to the system in a prudent manner.

¹¹ This will be subject to consultation by the Regulatory Authorities in due course.

1 Introduction

1.1 SONI and EirGrid

EirGrid and SONI are the Transmission System Operators (TSOs) in Ireland and Northern Ireland. It is our job 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-synchronous¹² sources, such as wind generation, relative to the system demand.

The studies 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 is not increased, curtailment on installed wind could rise 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 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.

¹² 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.

The results of the programme are now beginning to deliver benefits to the consumer. In recent months the allowable SNSP level has been increased to 55% following the successful conclusion of a 55% SNSP 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)¹³.

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;
- 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;

¹³ 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 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 deliver¹⁴.

1.4 Interim and Enduring Arrangements

The SEM Committee decided that the implementation of the DS3 System Services arrangements would be divided into two phases. The enduring arrangements will deliver competitive procurement, where appropriate, for the 14 services. A cost-reflective tariff will be applied to services where there is insufficient competition.

During the interim period, the TSOs will contract for services with all eligible providers, who will be paid at a rate, approved by the RAs, for the volume of services they are able to deliver in each trading period.

Under both arrangements, potential providers will be required to participate in a procurement exercise. Further details on the procurement process for the interim arrangements will be provided at a DS3 System Services Industry Forum scheduled for 11 April 2016 in Dundalk.

The Regulatory Authorities recently held a consultation on the DS3 System Services Qualification Process and Contract Design, which outlined options and proposals related to the procurement process for the enduring arrangements. Following publication of the Regulatory Authorities' decision paper on these issues, we will develop and consult on the contracts for the enduring arrangements and the associated detailed procurement process.

1.5 Transition to New Technologies

We are required to procure system services in an efficient manner. Given the increasing reliance on system services, we are of the opinion that these should only be paid for where delivery and quality of performance can be measured. We therefore need to establish reliable methods for measuring quality of service provision for all 14 services.

We have been able to build confidence in traditional power system technologies with many years of proven experience. The large scale deployment of new technologies through the DS3 System Services enduring arrangements is intended to reduce total costs and facilitate the delivery of public policy objectives. However, we will need to be confident that this deployment will not inadvertently undermine the resilience and security of the power system. As TSOs, we have a duty to maintain system stability and avoid loss of supply. We therefore need to take steps to identify the associated risks, obtain information about the capability of new types of service provider and manage this transition in a prudent fashion.

¹⁴ 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.

The interim arrangements provide an ideal opportunity to establish the mechanisms by which the characteristics of new technologies can become “Proven” and “Measureable” for the widest range of non-energy system service provision possible. We propose to use technology trials to provide potential providers with an opportunity to demonstrate the capabilities of technologies that have not previously delivered system services on a system with similar characteristics to that of the all-island system which we operate¹⁵.

We will also need to be able to measure the quality of provision of “fast” services i.e. Fast Frequency Response (FFR), Fast Post-Fault Active Power Recovery (FPFAPR) and Dynamic Reactive Response (DRR). We propose to explore this during the interim phase using technology trials.

Further information on the proposed technology trials will be provided at a DS3 System Services Industry Forum scheduled for 11 April 2016 in Dundalk. We also plan to publish a paper following the workshop that will outline our proposals for how the first set of trials will work as well as how we envisage the arrangements working on an enduring basis.

The interim rates, combined with an appropriate procurement strategy, should provide the opportunity for a range of new technologies¹⁶ to prove their ability to provide DS3 services. New service providers will increase the amount of competition in the system services market, and these interim arrangements will facilitate capturing the benefit of increased competition within the first auction in 2017.

1.6 Purpose of this Paper

The purpose of this paper is to provide stakeholders with the information that they need to assess the proposed payment rates for all system services during the interim period. We pose a series of questions within the paper to structure responses around.

1.7 Structure of this Paper

This paper provides a high level overview of the process that is being followed to implement the DS3 System Services arrangements, which are necessary if higher amounts of non-synchronous renewable generation are to be accommodated on the system. It provides a description of the new system services, and the benefits that could be obtained by early utilisation of these through the interim arrangements.

The paper then considers the relative importance of the new services and describes the methodology that has been used to calculate the proposed payment rates. Subsequently the rates and the potential impact on end user tariffs are presented.

The paper concludes with details of how to respond to the consultation.

¹⁵ Note: this could include aspects such as the size of the synchronous system, the generation portfolio and the SNSP levels among other technical parameters.

¹⁶ Including windfarms, demand side units, and storage (e.g. batteries, flywheels)

2 System Services Required

2.1 Existing Services

EirGrid and SONI have licence and statutory obligations to procure sufficient system services to enable efficient, reliable and secure power system operation. The contractual arrangements and payment rates in Ireland and Northern Ireland were harmonised following the introduction of the SEM. Seven products are procured under these Harmonised Ancillary Services (HAS) arrangements. These are:

- Primary Operating Reserve (POR)
- Secondary Operating Reserve (SOR)
- Tertiary Operating Reserve 1 (TOR1)
- Tertiary Operating Reserve 2 (TOR2)
- Replacement Reserve – Synchronised (RRS)
- Replacement Reserve – Desynchronised (RRD)
- Steady-State Reactive Power (SSRP)

Generators are obliged by the Grid Codes to provide all of these existing ancillary services, while licences oblige them to enter into agreements with the TSOs to cover the associated commercial arrangements. The Grid Codes specify the parameters within which they must be delivered. The rates that these services are paid at are approved through the HAS arrangements approved annually by the respective Regulatory Authorities. The terms of the HAS contract can only be varied following approval by the relevant Regulatory Authority.

2.2 New Services

While the existing services can support up to 55%¹⁷ non-synchronous generation on the all-island system, new services are required to support a move to higher levels of non-synchronous generation. Through the “*Facilitation of Renewables*” studies and analyses undertaken as part of the DS3 programme we have identified seven new services that will be required to maintain the resilience of the power system at SNSP levels of up to 75% by 2020. These new services are:

- Synchronous Inertial Response (SIR)
- Fast Frequency Response (FFR)
- Ramping Margin 1 (RM1)
- Ramping Margin 3 (RM3)

¹⁷ On 16 October 2015 we commenced a trial to assess system behavior while operating at 55% SNSP. Following a successful conclusion to the trial, the SNSP limit was permanently increased from 50% to 55% from 1 March 2016. Further information on this SNSP increase and the associated benefits are presented in Section 4.2.

- Ramping Margin 8 (RM8)
- Fast Post-Fault Active Power Recovery (FPFAPR)
- Dynamic Reactive Response (DRR)

The Grid Codes do not oblige generators, or other service providers, to deliver these. However through the DS3 System Services arrangements, the standards to which providers will offer these on a commercial basis are being developed. This will necessitate a consideration of a range of issues including standards, performance monitoring, and settlement issues. These are being dealt with outside the scope of this paper. Table 2 provides a high-level summary of the DS3 System Services products.

2.3 Relative Importance of Services

The regulated tariffs for the enduring arrangements will be based on detailed analysis to ensure that they are cost reflective for the consumer and within the overall value that they bring. These enduring rates are designed to trigger investment in complementary performance capability. The “availability” payment basis to be applied for all services means that there is likely to be a need to examine the application of system scarcity scalars for some services to ensure that payments reflect the actual system needs.

As these scalars and the cost reflectivity analyses have not been completed at this time, interim rates have been set based on consideration of the following:

1. A forecast of the relative value of the services in 2020, as set out in the DS3 System Services TSO Recommendations Paper¹⁹ published in May 2013: this is the best information available to us at the current time on the relative value of the services to the system in the longer term;
2. The immediate importance of each service when making the next step change in SNSP: some services will have a greater impact than others on our ability to accommodate a higher level of SNSP on the system in the short term.

The weightings selected for the 2016/17 tariff year are shown in Table 3. This table also includes a summary of the reason each weighting was selected.

Consultation Question 1: Should we take any other factors into account when determining the relative importance of each service during the interim period?

¹⁹ DS3 System Services TSO Recommendations Report to the SEM Committee – see [here](#)

Table 2: Summary of DS3 System Services Products

Service Name	Abbreviation	Unit of Payment	Short Description
Synchronous Inertial Response	SIR	MWs ² h	(Stored kinetic energy)* (SIR Factor – 15)
Fast Frequency Response	FFR	MWh	MW delivered between 2 and 10 seconds
Primary Operating Reserve	POR	MWh	MW delivered between 5 and 15 seconds
Secondary Operating Reserve	SOR	MWh	MW delivered between 15 to 90 seconds
Tertiary Operating Reserve 1	TOR1	MWh	MW delivered between 90 seconds to 5 minutes
Tertiary Operating Reserve 2	TOR2	MWh	MW delivered between 5 minutes to 20 minutes
Replacement Reserve – Synchronised	RRS	MWh	MW delivered between 20 minutes to 1 hour
Replacement Reserve – Desynchronised	RRD	MWh	MW delivered between 20 minutes to 1 hour
Ramping Margin 1	RM1	MWh	The increased MW output that can be delivered with a good degree of certainty for the given time horizon.
Ramping Margin 3	RM3	MWh	
Ramping Margin 8	RM8	MWh	
Fast Post Fault Active Power Recovery	FPFAPR	MWh	Active power >90% within 250 ms of voltage >90%
Steady State Reactive Power	SSRP	MVArh	MVAr capability*(% of capacity that capability is provided)
Dynamic Reactive Response	DRR	MWh	MVAr capability during large (>30%) voltage dips

Table 3: Relative Importance of DS3 System Services Required from 1 October 2016

Service Name	Unit of Payment	Current Payments	2020 System Needs	2016 System Needs	Commentary
Synchronous Inertial Response (SIR)	MWs ² h		2%	6%	2020 values assume that changes to the RoCoF standard have been implemented. This service may be of higher importance in the short term.
Fast Frequency Response (FFR)	MWh		12%	6%	The importance of this service directly relates to the outcome of the RoCoF project. Until the outcomes are known, we propose balancing payments between SIR and FFR.
Primary Operating Reserve (POR)	MWh	15%	11%	13%	POR, SOR and TOR remain important in the short term, with actual payments approximately equivalent between years. Lower total percentage reflects larger total payments across all services.
Secondary Operating Reserve (SOR)	MWh	18%	7%	11%	
Tertiary Operating Reserve 1 (TOR1)	MWh	21%	8%	10%	
Tertiary Operating Reserve 2 (TOR2)	MWh	12%	8%	10%	
Replacement Reserve – Synchronised (RRS)	MWh	13%	1%	2%	More valuable with increased presence of wind, solar and demand side units.
Replacement Reserve – Desynchronised (RRD)	MWh		1%	7%	
Ramping Margin 1 (RM1)	MWh		3%	3%	
Ramping Margin 3 (RM3)	MWh		5%	5%	
Ramping Margin 8 (RM8)	MWh		5%	5%	
Fast Post Fault Active Power Recovery (FPFAPR)	MWh		17%	5%	A scarcity scalar is required to control the scale of payments. This is not implementable in the timeline for the interim arrangements.
Steady State Reactive Power (SSRP)	MVarh	21%	11%	15%	
Dynamic Reactive Response (DRR)	MWh		10%	2%	A scarcity scalar is required to control the scale of payments. This is not implementable in the timeline for the interim arrangements.

3 Interim Tariff Methodology

3.1 Overview

When calculating payment rates for the interim period, we applied the following considerations:

- The total payments for the existing seven HAS services in the interim DS3 System Services arrangements should at least be the same as in the HAS arrangements;
- The interim rates, in so far as possible, should reflect the importance of the services in the short term and be a bridge to the enduring DS3 System Services arrangements in the long term. The relative technical weightings as estimated in the 2013 TSO Recommendations Paper are the basis for this long term view;
- The introduction of new DS3 system services is the only basis for the increase in system service revenues for the interim phase;
- The rates should be based on the expected capability of anticipated service providers²⁰. Provision of DS3 system services from new technologies is unproven and the volumes therefore uncertain in the short term.

3.2 Estimation of Volumes

The first step in the calculation was to estimate the DS3 service provision capability for different technology types/units for all the DS3 services. The next step was to run a 2015/16 model of the power system for 8760 hours and combine this with the DS3 service provision capabilities to estimate potential annual remuneration volumes for each distinct service at a system level. This was verified against the 2015/16 budget for the existing services.

For the “fast” services, we based our calculation of tariffs on the full volume of services that could potentially be delivered by the existing portfolio, to ensure that the tariffs reflect our understanding of the probable capability of plant and therefore the value of each unit of service delivered. We note that we may not be in a position to measure the delivery of these services, and therefore enter into contracts with all potential providers for them. However we consider it important that the maximum rates paid under any technology trials would reflect the overall value to the system in the context of the wider generation portfolio.

3.3 Calculation of Rates

The relative values of system services in 2016/17 (Table 3) were used to allocate a base revenue figure across the 14 services. The process was as follows:

²⁰ As determined by the SEM Committee in its procurement decision paper, payments are “availability”-based i.e. there is a dependency on a unit’s dispatch position.

- We started with a notional total “pot” size. This was designed to ensure that the total payment for the seven existing services at least equals the existing budget for these services when allocated according to the 2016/17 relative weightings.
- We then calculated the pots for each individual service using the relative DS3 service weightings listed in Table 3 above.
- From these relative weightings we calculated the interim tariffs by dividing the relative “pots” by the estimated annual DS3 service remuneration volume.

When calculating these rates, we assumed full provision of the new services by all anticipated providers, without any restrictions due to performance monitoring or the application of performance scalars.

The proposed payment rates are listed in Table 4.

Table 4: Proposed DS3 System Service Interim Tariff rates

Service Name	Unit of Payment	Proposed Rate €
Synchronous Inertial Response (SIR)	MWs ² h	0.004
Fast Frequency Response (FFR)	MWh	1.96
Primary Operating Reserve (POR)	MWh	2.47
Secondary Operating Reserve (SOR)	MWh	1.37
Tertiary Operating Reserve (TOR1)	MWh	1.19
Tertiary Operating Reserve (TOR2)	MWh	0.99
Replacement Reserve - Synchronised (RRS)	MWh	0.13
Replacement Reserve – Desynchronised (RRD)	MWh	0.64
Ramping Margin 1 (RM1)	MWh	0.08
Ramping Margin 3 (RM3)	MWh	0.13
Ramping Margin 8 (RM8)	MWh	0.10
Fast Post Fault Active Power Recovery (FPFAPR)	MWh	0.13
Steady State Reactive Power (SSRP)	MVArh	0.20
Dynamic Reactive Response (DRR)	MWh	0.03

3.4 Exchange Rate Methodology

The proposed Interim Tariff payment rates have been initially calculated in Euros. In determining the associated sterling rates, we propose to apply the same methodology for the interim arrangements as has been used for the Harmonised Ancillary Services (HAS) arrangements. This methodology is consistent with that applied under the Trading and Settlement Code for the calculation of the annual capacity exchange rate i.e. the average of the forwards rates for the forthcoming year as taken over a period of 5 days prior to tariff and payment setting.

3.5 Potential Impact on End User Tariffs

As described further in section 5, we assume that payments will only be made where we are able to verify delivery of the service. When calculating the impact on end user tariffs the following assumptions have been made:

- Performance scalars of 1 have been assumed (actual performance reliability will likely result in performance scalars of less than 1 for some service providers);
- DS3 System Services expenditure is shared across the island through inter-TSO allocations on the same basis as the current arrangements.

Based on these assumptions, the rates proposed would potentially increase the total payments for system services to existing providers by approximately €20m. However based on the interaction with the CPM and the associated Best New Entrant calculation this will likely reduce the SEM capacity pot by a similar amount.

The amount that will be paid out through technology trials to new unproven providers or to assess the options for measuring the performance of “fast” services is currently uncertain. However as we intend to limit the amount that we rely on these new providers/services, until their characteristics are demonstrated, we do not expect the payments for these trials to exceed €3m²¹ over the 2016/17 tariff year.

End user prices are unlikely to be materially impacted by the introduction of the new system services; however there will be an increase in SSS in NI and TUoS in Ireland, which should be offset by a reduction in the SEM capacity pot²² (based on the current methodology). The learning obtained by both the TSOs and service providers through these interim arrangements should deliver benefits in subsequent years. The proposed payment rates also have the effect of rebalancing income towards service providers that provide greater value for consumers.

These payment rates will only apply for the interim period. The Regulatory Authorities and TSOs are undertaking separate analyses and consultations to determine the regulated tariffs that will apply under the enduring arrangements.

Consultation Question 2: Have you any comments on the methodology used to calculate the rates?

²¹ This is less than 10% of the anticipated payments to proven providers, reflecting the need to incorporate the new technologies on to the system in a prudent manner.

²² This will be subject to consultation by the Regulatory Authorities in due course.

4 Benefits Provided by the Interim Phase

4.1 Overview

The SEM Committee decided²³ that “an interim set of tariffs will be established for all services to be in place not later than October 2016 to apply until October 2017. This will allow for the early implementation of system services and an increased level of wind penetration, assist the development and operation of the enduring design and will provide information on the existing capability of the system”.

When determining the interim payment rates, we have considered the benefits that can be achieved through these arrangements both in the short term and long term. The transition to new trading arrangements for wholesale electricity in Q4 2017, including the interaction between the system services and the balancing markets, means that it is not straightforward to model the impact of the enduring DS3 arrangements on end user prices at present. However savings are expected to be obtained across a number of areas including the Capacity Remuneration Mechanism, ex-ante trading of wholesale electricity, the imbalance price and in the cost of balancing the system.

Further evolution of the wholesale market to incorporate the requirements of the Electricity Balancing Network Code, will also be relevant to a quantitative assessment of the long term benefits of DS3 System Services. What is clear though is that a higher utilisation of non-synchronous sources of electricity, facilitated by an increase in SNSP²⁴, will reduce costs for end users when compared to the current maximum levels that can be accommodated.

This section focuses on the benefits that can be obtained from the interim arrangements, when compared to remaining with the current seven system services until the enduring procurement exercise takes place.

4.2 Benefits Already Obtained from DS3

On 16 October 2015, we commenced a trial to assess system behaviour with higher levels of SNSP. This was made possible by the introduction of the new control centre tools and operational policies developed over the last four years. Given the implications of a loss of system stability, this move is being closely monitored in real-time, supported by off-line analyses.

The parameters that are being monitored include:

- System inertia
- Rate of Change of Frequency

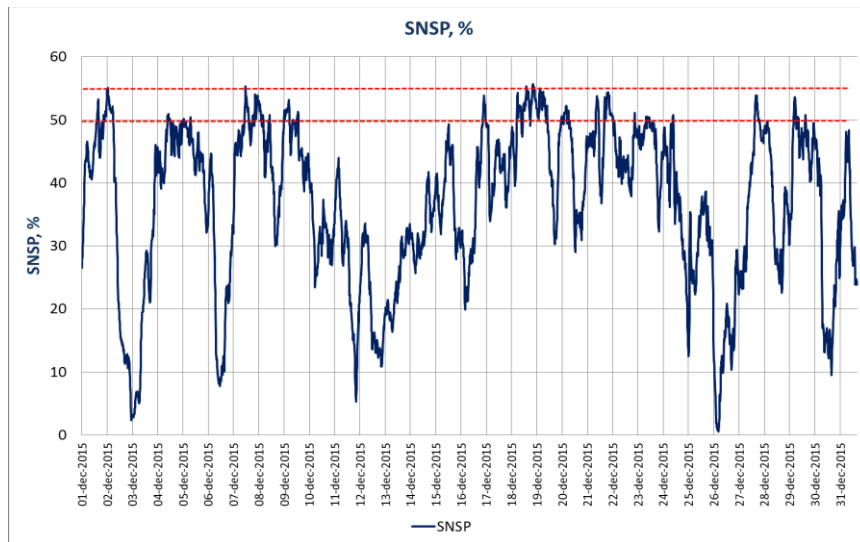
²³ DS3 System Services Procurement Design and Emerging Thinking Decision Paper (SEM-14-108): <http://www.semcommittee.eu/GetAttachment.aspx?id=c0f2659b-5d38-4e45-bac0-dd5d92cda150>

²⁴ This will require the full range of changes delivered by DS3, not only the system services

- Frequency, Transient and Voltage Stability
- System frequency nadir/zenith
- System oscillation

The amount of non-synchronous sources of electricity are now great enough that from 16 October 2015 to 8 January 2016 the SNSP was over 50% for 10% of the time. This is illustrated in Figure 1.

Figure 1: Percentage of SNSP, December 2015



The trial has shown that with the current tools and services and the generation portfolio that has been available, it is possible to maintain system stability up to 55% SNSP. Following a successful conclusion to the trial, the SNSP limit was permanently increased to 55% from 1 March 2016.

Operating the system with SNSP up to the higher limit of 55% reduces the curtailment of wind, and consequentially reduces constraint costs in the SEM.

During the period from 16 October 2015 through 31 January 2016, we estimate that the 5% increase in the SNSP limit resulted in a reduction in wind curtailment of approximately 12 GWh. This equates to a reduction of 6.5% in total wind curtailment relative to operation with an SNSP limit of 50%. If you price the avoided curtailment using the volume-weighted System Marginal Price (SMP) during this period of 47 €/MWh, there was a benefit of €0.6m over the period.

The increase in the SNSP limit to 55% should provide substantially greater benefit as the amount of wind farms connecting to the Ireland and Northern Ireland power system increases in the coming years. This is because there will be a larger number of hours when the total amount of wind generation results in SNSP exceeding 50%.

4.3 Direct Financial Benefits for Consumers

Based on the proposed tariffs, over the interim period, consumers should see a direct benefit through increases in the value provided by generators for similar total costs. The

increase in payments for the system services that are of most use to the TSOs rebalances the allocation of payment towards service providers that provide more useful characteristics. While the magnitude of the capacity payment mechanism “pot”, which rewards all available generation equally, is expected to reduce, the total amounts paid out across all generation should remain broadly similar.

In addition, the higher level of SNSP (55%) will be reflected in the constraint forecasts used to calculate the Imperfections Tariff for 2016/17. This will result in a lower tariff than would have otherwise been put in place. Should it be possible to raise the SNSP limit further during the interim period, this would reduce the actual dispatch balancing costs further. Any further reduction in these costs would be passed back to suppliers through reductions in the Imperfections Tariff in subsequent years²⁵.

4.4 Qualitative Assessment of Wider Benefits

The SEM Committee based its decision to progress with interim arrangements on the qualitative benefits that could be obtained by using a stepping-stone to transition to the enduring approach. These mostly relate to all parties being better informed in advance of the first Year+1 and Year+X auctions in 2017, resulting in more competitive and cost-reflective auctions.

For end users, the learnings from the interim period should result in an earlier increase in SNSP, with a consequential reduction in costs across the I-SEM trading areas.

These qualitative benefits are summarised in Table 5 overleaf.

Consultation Question 3: Are there any other benefits from the interim arrangements that should be considered?

²⁵ The Imperfections Tariff is set to recover the forecast costs. The tariff for future years is adjusted to reflect any over or under recovery to ensure that customers are only charged for the actual costs incurred in balancing the system.

Table 5: Summary of the Qualitative Benefits that can be obtained from the Interim Arrangements

Area	Aspects	Outcome
Create marketplace for new products	<p>Trigger interest in provision of non-mandatory services</p> <p>Providers tested and capabilities verified in advance of enduring arrangements</p> <p>Developers preparing for participation in enduring auctions (technical studies etc)</p>	<p>Greater competitive pressure applied to bids in the enduring auction process. Benefits for customers seen in the first Year+1 and Year+X auctions.</p>
Learnings for TSO	<p>Development of commercial arrangements that underpin the enduring approach</p> <p>Validation of settlement systems</p> <p>Enable further development of operational policies</p> <p>Testing assumptions on capability of existing plant (baseline)</p> <p>Indication of market interest by potential new providers</p>	<p>Smoother transition to enduring commercial and settlement processes.</p> <p>Potential for earlier increase in SNSP (with associated reduction in system balancing costs charged to customers)</p> <p>Greater confidence in the volumes that can be provided through the auction process</p> <p>Testing of new providers / technologies, increasing competitive pressure in the auction process</p>
Learning for Service Providers	<p>Capabilities verified in advance of participation in auction</p> <p>Reduces risk premia when bidding in auctions in 2017 (including in I-SEM CRM)</p>	<p>More competitive bids into the first Year+1 and Year+X auctions, increasing chance of success</p>

5 Impact on Service Providers

5.1 Costs Incurred

Service providers in the interim arrangements will incur costs participating in the procurement process to enter into the new contracts. Provision of the seven existing services is mandatory for licenced generators, therefore this cost is unavoidable.

Further costs will be incurred by providers of the new services (not limited to licenced generators). They may need to undertake technical studies to determine their ability to provide the services, and will be exposed to the impact of performance scalars on the income associated with any errors in those analyses.

Providers of the new “fast” services (Fast Frequency Response, Fast Post-Fault Active Power Recovery and Dynamic Reactive Response) may also have to pay for the installation of appropriate performance monitoring equipment at their sites.

5.2 Performance Monitoring

At its heart, the DS3 Programme recognised a need for increased or altered performance from a range of service providers to complement the needs of the power system and to facilitate public policy energy objectives. A key aspect of getting the performance necessary is ensuring a credible and robust enforcement of existing standards and linking the future requirements to appropriate revenue streams to incentivise efficient and effective investment.

Significant improvements in the capability and performance of the existing generation portfolio have been realised through focusing on assessment of compliance with existing Grid Code standards, through procedures and manual processes. This has resulted in decreased costs to the end consumer, a level playing field for participants and increased security and reliability of the generation²⁶ portfolio.

To get the performance change required to support higher levels of SNSP, it will be necessary to extend this robust monitoring of the 7 existing services to a wider set of 14 needed services. This will require moving these manual processes to automated systems over time, resulting in robust, credible and timely performance metrics for each provider and each distinct service.

The DS3 Programme has a specific workstream to achieve this. Over the interim period, the performance scalar will be calculated by leveraging the existing manual systems. This will be augmented by some small scale automation to accommodate some of the new services. For the enduring process a new Enhanced Performance Monitoring System (EPMS) is being developed to process the data recorded for each provider across all 14 services.

²⁶ Under the HAS arrangements, the services have been predominately provided by generators.

As measured performance is critical to achieving the broader DS3 programme outcomes, the TSOs consider that service providers will need to have adequate performance monitoring equipment for the TSOs to be able to verify performance.

For the avoidance of doubt, the TSOs will only pay for services where performance can be verified, either manually through the interim calculation process or automatically through the EPMS.

Consultation Question 4: Have we set out the relevant impacts on service providers over this interim period?

6 Next Steps

6.1 Consultation Responses

SONI and EirGrid welcome feedback on the questions posed within this paper, which will be used to inform the payment rates that are submitted to the RAs for approval.

Responses should be submitted to DS3@soni.ltd.uk or DS3@EirGrid.com before 20 May 2016 using the associated questionnaire template. It would be helpful if answers to the questions include justification and explanation. If there are pertinent issues that are not addressed in the questionnaire, these can be addressed at the end of the response.

It would be helpful if responses are not confidential. If you require your response to remain confidential, you should clearly state this on the coversheet of the response. We intend to publish all non-confidential responses. Please note that, in any event, all responses will be shared with the Regulatory Authorities to inform their approval of the final payment rates.

6.2 Stakeholder Workshop

To facilitate stakeholder engagement we will host an industry workshop during the consultation period. This workshop, which is scheduled for 11 April 2016 in Dundalk, will provide an opportunity for discussion on the details of the consultation paper. The workshop will also focus on all other core aspects of the interim arrangements (e.g. contracts, procurement, technology trials, settlement etc.). Should you wish to register, please contact DS3@soni.ltd.uk or DS3@EirGrid.com

6.3 List of Consultation Questions

Question 1: Should we take any other factors into account when determining the relative importance of each service during the interim period?

Question 2: Have you any comments on the methodology used to calculate the rates?

Question 3: Are there any other benefits from the interim arrangements that should be considered?

Question 4: Have we set out the relevant impacts on service providers over this interim period?