DS3 System Services Tariffs for Regulated Arrangements

RECOMMENDATIONS PAPER

DS3 System Services Implementation Project

23 October 2017

EIRGRID SONI

Disclaimer

EirGrid as the Transmission System Operator (TSO) for Ireland, and SONI as the TSO for Northern Ireland make no warranties or representations of any kind with respect to the information contained in this document. We accept no liability for any loss or damage arising from the use of this document or any reliance on the information it contains. The use of information contained within this consultation paper for any form of decision making is done so at the user's sole risk.

Synopsis

Introduction

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). The development of DS3 System Services is therefore a necessary and critical component to facilitate the integration of large scale variable non-synchronous renewable generation by 2020.

Consultation on Regulated Arrangements

To help drive the necessary investment in DS3 System Services provision to meet this objective, the SEM Committee has determined that regulated tariff arrangements should be employed at least to 2019. The longer term System Services market mechanisms are being developed separately by the Regulatory Authorities.

In July 2017 we held a consultation on our proposed tariff framework and tariff rates to apply to all 14 services following execution of the new system services contracts in May and September 2018. We received 23 stakeholder responses to the consultation.

In this paper, we set out our recommendations in relation to the tariff framework to apply for the period from 1 May 2018. It has been submitted to the SEM Committee to inform their decision on the various elements of the design.

In that context, the SEM Committee's decision paper will set out the final decisions on the design to be implemented by the TSOs. The SEM Committee decision on certain elements of the design may differ in parts to our recommendation.

The TSOs will assess the final SEM Committee decision and develop a plan to implement the various aspects of the arrangements as soon as possible.

TSO Recommendations

Based on our analysis and our review of stakeholder responses, we have developed a set of recommendations on a Regulated Tariff framework that we believe can meet the outlined challenges and constraints and which accounts for a range of considerations in a balanced manner.

Our recommendations can be summarised as follows:

Payment Structure

The following should apply as the baseline tariff rates for the duration of the regulated tariff arrangements:

- Existing 11 services: The rates for the existing 11 services recently approved[1] for use during the Interim Tariffs "roll-over contract" period from 1 October 2017 through 30 April 2018 should be increased by 5%.
- 3 new services: The rates for the three services (FFR, FPFAPR, and DRR) to be introduced in September 2018, which were included in the original Interim Tariffs decision paper[2] published in August 2016, should be increased by 5%.

A 'stepped' scarcity scalar should be introduced which pays multiples of the base tariff rate for system services provision at times when the System Non-Synchronous Penetration (SNSP) level is high. We recommend setting the scalar values based on analysis of the 2019/20 New Providers portfolio scenario and an expenditure cap of €235 million. We recommend that the scarcity scalar framework proposed in the consultation paper be tweaked as follows:

- FFR should be paid at the base tariff rate for SNSP levels between 50% and 60%. In the consultation paper, we had proposed no payment below 60%.
- The scarcity scalar values to apply above 60% and 70% SNSP levels should be adjusted downwards to offset the 5% recommended increase to the base tariff rates and the additional expenditure arising from FFR payments applying at the lower 50% SNSP level.

We also recommend the introduction of a new set of product scalars to incentivise enhanced provision of services where this is of value to the system. Our recommendations on the Product Scalar designs are set out in the Regulated Arrangements Scalar Design Recommendations Paper, which should be read in conjunction with this paper.

With regard to the SEM Committee decision to pay for service provision based on the higher payment arising from a Providing Unit's market position and physical position, the TSOs are working with the Regulatory Authorities to develop a plan for developing the payment rules ahead of I-SEM go-live on 23 May 2018. There will be a need for stakeholder engagement activities during the ruleset development. It is intended that market participants will know the final payment rules ahead of I-SEM go-live and will therefore be in a position to reflect the impact of these rules when formulating their

[1] In May 2017, we published a consultation paper outlining the DS3 System Services tariff rates that we were proposing to apply to the existing Interim Framework Agreements for the 11 services that are being extended to the end of April 2018. Following consideration of the responses to the consultation, we submitted a recommendations paper to the SEM Committee. The Regulatory Authorities reviewed the TSOs' consultation paper, stakeholder responses and the TSOs' recommendations paper. Following this review, the SEM Committee published a decision paper on 21 July 2017 approving the tariff rates as set out in the TSOs' recommendations paper for the "roll-over contract" period from 1 October 2017 through 30 April 2018.

[2] DS3 System Services Interim Tariff Rates Decision Paper: http://www.eirgridgroup.com/site-files/library/EirGrid/DS3-System-Services-Decision-Paper-on-Interim-Tariffs-FINAL.pdf

energy bids. The plan for resettlement will be communicated to stakeholders when the ruleset is finalised ahead of I-SEM go-live.

Procurement and Contractual Arrangements

We recommend that the risk of over-expenditure arising from over-investment in high availability technologies should be managed through the procurement process. In addition to mitigating the risk of over-expenditure, this approach also has the benefit of providing greater investment certainty for those high availability service providers that are successful in the procurement process.

In summary, we recommend that the procurement process should be divided into two distinct categories:

- **Tariff Arrangements for Non-Expenditure Risk Services/Units**
    - These arrangements are 'Volume Uncapped' meaning that a volume limit is not applied to any of the system services being procured. Regulated tariff rates will apply for service providers that receive a contract under these arrangements.
- **Competitive Arrangements for Expenditure Risk Services/Units**
    - There arrangements are 'Volume Capped' meaning that an upper limit will be applied to the volume of relevant system services being procured and for which prospective service providers will offer a competitive price as part of their tender.
    - Volume Capped procurement is proposed to apply to high availability Providing Units, such as Demand Side Units (DSUs) and storage, whose availability is not linked to energy market dispatch. It will apply to a subset of system services only namely FFR, POR, SOR, TOR1 and TOR2. We recommend that high availability technologies should be eligible to receive tariff contracts for the other nine services.

We recommend that different approaches to contract certainty should be adopted for those contracts awarded under the tariff arrangements and those contracts awarded under the separate volume-capped competitive procurement processes. For example, the tariff arrangements should allow for conditional reviews of the tariff structure (and associated scarcity scalar structure) to be initiated during the term of the regulated arrangements under certain conditions.

With regard to the duration of the arrangements, the TSOs recommend a commitment be given that the tariff arrangements remain in place for a minimum duration of 6 years. For the competitive arrangements for expenditure risk services/units, we recommend that contracts aimed at securing service provision at future delivery dates should have a guaranteed minimum term of 5 years commencing at the future delivery date in order to facilitate new investment where appropriate.

Contents

Synopsis **3**
1 Introduction and Background **8**
1.1 Background 8
1.2 Purpose of the Paper 9
1.3 Structure of the Paper 9
2 Responses to Consultation **11**
3 TSOs' Recommendations **13**
3.1 Overview 13
3.2 Over-expenditure Risk due to High Availability Technologies 13
3.2.1 Tariff Arrangements for Non-Expenditure Risk Services/Units 15
3.2.2 Competitive Arrangements for Expenditure Risk Services/Units 16
3.2.3 Transition period (1 May 2018 to 1 September 2018) 18
3.3 Base Tariffs 18
3.4 Contract Certainty 19
3.4.1 Contract Certainty for Tariff Arrangements 20
3.4.2 Contract Certainty for Competitive Arrangements 20
3.5 Price Certainty 21
3.5.1 Price Certainty for Tariff Arrangements 21
3.5.2 Price Certainty for Competitive Arrangements 21
3.6 Scarcity Scalar Framework 21
3.7 Market versus Physical Dispatch Position 23
4 Considerations and Rationale for Recommendations **25**
4.1 Introduction 25
4.2 Guiding Principles 25
4.3 Payment Structure 28
4.3.1 FFR Scarcity Scalar 29
4.3.2 Revenue volatility 30
4.3.3 Use of 'operational SNSP' 36
4.3.4 Market versus Physical Dispatch Position 37
4.4 Procurement and Contractual Arrangements 38
4.4.1 Over-Expenditure Risk due to High Availability Units 38
4.4.2 Contract Certainty and Structure 40
5 Next Steps **43**
Appendix 1: Stakeholder Views and TSOs' Response **44**
A1.1 Overview 44
A1.2 Base Tariffs 44
A1.3 Contract Certainty 46
A1.4 Price Certainty 51
A1.5 Scarcity Scalar Framework 57
A1.5.1 'Stepped' scalar versus 'Linear' scalar 58
A1.5.2 Re-design of 'Stepped' scalar 59
A1.5.3 Re-allocation of scalar revenue to increase base tariffs 61
A1.5.4 SNSP Value Transparency 62

A1.6 Over-expenditure Risk due to High Availability Technologies 64
A1.7 Market versus Physical Dispatch Position 68
Appendix 2: System Services Required 73
A2.1 Overview of System Services 73
Appendix 3: Additional Consumer Benefit for High Wind Scenario 75
Appendix 4: Additional Modelling Results 77

1 Introduction and Background

1.1 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 (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)[3].

Following on from that decision, 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 Tariff Framework Agreements in Ireland and Northern Ireland.

On 23 March 2017, the SEM Committee published an information paper on the DS3 System Services Future Programme Approach[4]. This paper sets out the SEM Committee's approach to the completion of the delivery and implementation of the new System Services arrangements as set out in the High Level Design (SEM-14-108). The approach set out in the SEM Committee paper takes into account the experience of the interim arrangements, responses to the public consultations on the various elements of the detailed design, developments with the EU Electricity Balancing Guideline and the I-SEM Stocktake.

In its paper, the SEM Committee sets out its view that:

- The 107 existing Interim Framework Agreements for the 11 services, due to expire in October 2017, will be extended until the end of April 2018 (procurement regulations mean that during this period no new entrants will be allowed onto the framework nor will existing providers be able to increase their contracted volumes) in order to facilitate learnings from the Qualification Trial Process to be

[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

[4] SEM Committee Information Paper on DS3 System Services Future Programme Approach: https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-17-017%20DS3%20System%20Services%20Future%20Approach%20Information%20Paper.pdf

integrated into the Regulated Arrangements and to facilitate the introduction of a new panel-based procurement process;

- The TSOs will run a Regulated Tariff procurement process in Q4 2017 for the 11 services to enable new contracts to be executed on 1 May 2018 – these arrangements will be open to a wider range of service providers; and
- The TSOs will run a further Regulated Tariff procurement process for 3 new services with a contract execution date of 1 September 2018[5]; and
- The Regulatory Authorities will review the options for competitive procurement for enduring implementation in the coming years. This initial investigative work on competitive procurement options started in Q1 2017.

In the next section, further information is provided on the context for and purpose of this TSO recommendations paper.

1.2 Purpose of the Paper

On 4 July 2017, EirGrid and SONI published two consultation papers on (1) the DS3 System Services Enduring Tariffs proposed to apply from 1 May 2018, and (2) the associated proposed DS3 System Services Enduring Scalar Design.

In the Enduring Tariffs consultation paper, we set out the proposed tariff framework and tariff rates to apply to all 14 services following execution of the new system services contracts in May and September 2018. The Enduring Scalar Design consultation paper looked at how scalars could be implemented to incentivise flexibility, reliability, and value for money, and set out our proposed approach on how these would be best implemented for the Regulated Arrangements.

Following consideration of the responses to the consultation we are publishing this recommendations paper for consideration by the SEM Committee.

The purpose of this paper is to provide stakeholders with information on our recommendations in relation to the tariff framework to apply for the period from 1 May 2018. It should be read in conjunction with the associated recommendations paper on the enduring scalar design published in parallel with this paper.

1.3 Structure of the Paper

This paper provides a high level overview of the stakeholder responses to the consultation on the various key elements. It also sets out our response to the issues

[5] The TSOs informed the SEM Committee of the necessity to stagger the introduction of the three fast-acting services (FFR, FPFAPR and DRR). This longer implementation timeline will allow for learnings from the Qualification Trial Process to be integrated into the arrangements and for the TSOs to develop the appropriate contractual definitions for technical product delivery, product response criteria, and settlement and performance monitoring system requirements for these three services.

raised by stakeholders and our final recommendation on the tariff framework to apply from 1 May 2018.

The remainder of the paper is structured as follows:

- Section 2 provides information on the number and type of responses received to the consultation.
- Section 3 set out the TSOs' recommendations on all of the key aspects of the regulated arrangements.
- Section 4 explains the rationale for the TSOs' recommendations including the main considerations in the context of the key issues raised in the consultation responses.
- Section 5 describes the next steps in terms of translating the SEM Committee decision in to the DS3 System Services contracts and procurement process as well as planned stakeholder engagement activities on relevant aspects of the decision.
- In the Appendices, stakeholder responses to the consultation are presented with the TSOs' responses to stakeholder comments included. Further information on the system services products, the results of additional analysis on the consumer benefits in 2020 associated with a high wind capacity factor year, and additional modelling results are also included.

2 Responses to Consultation

In total, 23 responses to the consultation were received from the stakeholders listed below. Three of the 23 stakeholders submitted separate public and confidential responses while one stakeholder submitted a confidential response only. The following stakeholders submitted non-confidential responses:

- WFSO
- Coillte
- AES
- Bord Gáis Energy
- Bord na Móna Powergen
- Demand Response Aggregators of Ireland
- Electricity Association of Ireland
- Electricity Exchange
- Element Power
- Endeco
- Enercon
- Energia
- ESB GWM
- Lumcloon
- Moyle Interconnector Ltd.
- PowerNI PPB
- Renewable Energy Systems Limited
- Siga Hydro
- Tynagh Energy Ltd.
- Innogy
- IWEA
- SSE

The views of respondents have been summarised and addressed in this paper. A number of respondents provided very specific replies, often reflecting the respondents' particular circumstances. In keeping with previous DS3 System Services consultation papers, all non-confidential responses have been published alongside this recommendations paper. In addition, all responses (including confidential responses) were shared with the Regulatory Authorities to inform their decision on the tariff design.

A number of respondents replied with comments outside the scope of this consultation. These have been or will be dealt with, as appropriate, in other consultations or fora. They include:

- Grid Code requirements; and

- Design of the Capacity Remuneration Mechanism.

3 TSOs' Recommendations

3.1 Overview

The regulated tariffs consultation covered a wide range of issues and proposals. However, at a high level, they can be broadly grouped into the following categories:

- Base Tariffs – The base tariff payment rates to which scalars would be applied in the arrangements.
- Contract Certainty – The term/duration of the contract and the level of certainty provided to service providers in that regard.
- Price Certainty – The level of certainty provided to service providers with respect to changes to the tariff rates and scalar values applied during the course of the arrangements.
- Scarcity Scalar Framework - The framework setting out how service providers' payments change depending on the SNSP level.
- Over-Expenditure Risk due to High Availability Technologies – The mechanisms through which the expenditure risk arising from technologies whose availability is not linked to energy dispatch decisions can be managed.
- Market versus Physical Dispatch Position – The ruleset for determining service providers' payments based on market and physical dispatch positions, and the TSOs' plans for implementation of the ruleset.

In the following sections, the TSOs' key recommendations are presented for each of the above categories.

The rationale for the TSOs' recommendations including the main considerations in the context of the key issues raised in the consultation responses can be viewed in Section 4.

3.2 Over-expenditure Risk due to High Availability Technologies

The direction by SEM Committee is that payments for DS3 System Services will be on an "availability" basis and that this should be interpreted as payment based on "*technical realisability*".

This means that some types of service providers could be available and eligible for payments for every hour of the year assuming they are not forced out or scheduled out for maintenance, even if the service is not required from those providers at all of these hours. The scale of overall payments will therefore increasingly depend on the portfolio of service providers and the expected availability of individual service providers.

With tariff arrangements that place no limit on the volume that can be added to the procurement framework, there would be a risk of over-expenditure should there be substantial overinvestment in specific new technologies.

Our recommendation is that the risk of over-expenditure arising from over-investment in high availability technologies should be managed through the procurement process.

In addition to mitigating the risk of over-expenditure, this approach also has the benefit of providing greater investment certainty for those high availability service providers that are successful in the procurement process.

Figure 1 provides a high-level overview of our recommended procurement process.

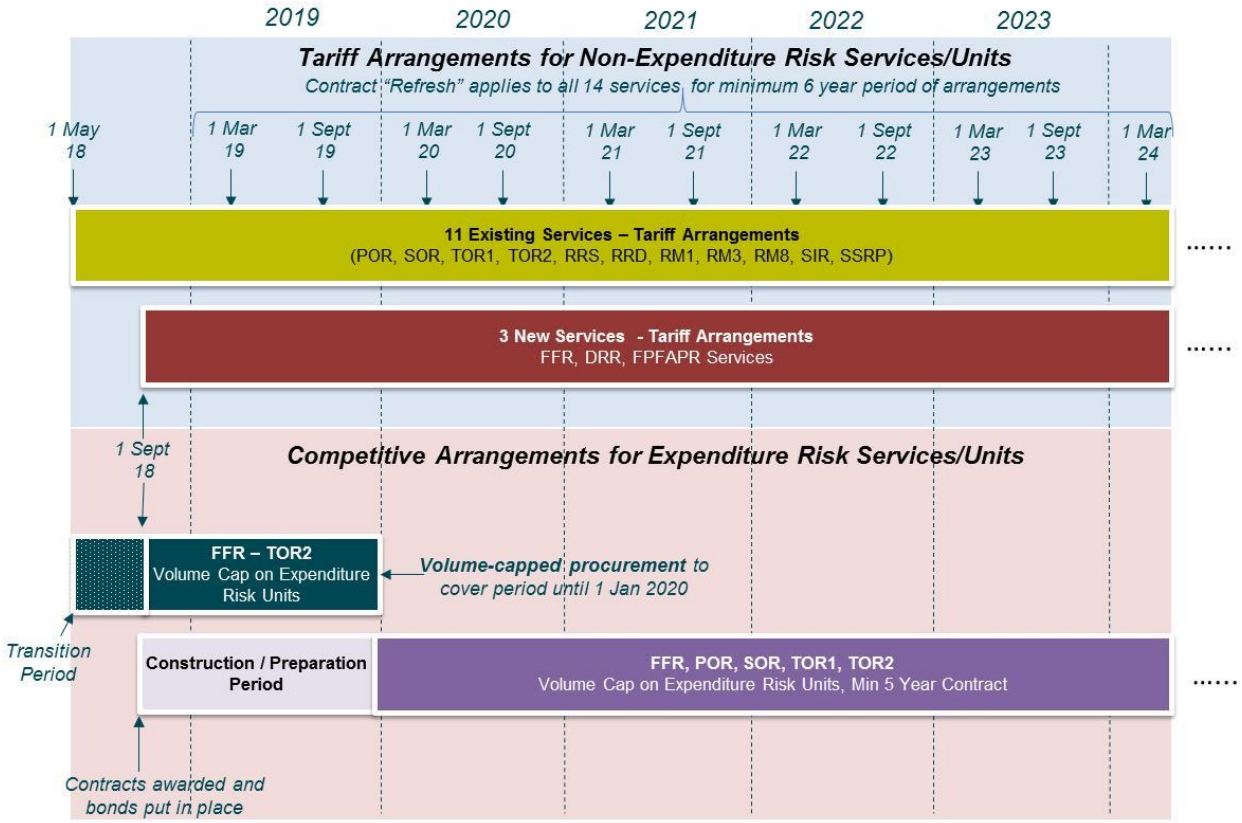

Figure 1: Overview of recommended procurement process

In summary, the procurement process can be divided into two distinct categories:

- **Tariff Arrangements for Non-Expenditure Risk Services/Units** – shown in the top portion of Figure 1 (shaded in blue)
    - These arrangements are 'Volume Uncapped' meaning that a volume limit is not applied to any of the system services being procured. Regulated tariff rates will apply for service providers that receive a contract under these arrangements.

- **Competitive Arrangements for Expenditure Risk Services/Units** – shown in the bottom portion of Figure 1 (shaded in pink)
    - There arrangements are 'Volume Capped' meaning that an upper limit will be applied to the volume of relevant system services being procured and for which prospective service providers will offer a competitive price as part of their tender. Volume Capped procurement is proposed to apply to high availability Providing Units whose availability is not linked to energy market dispatch. It will apply to a subset of system services only.

The two categories are explained in greater detail in the following sub-sections.

3.2.1 Tariff Arrangements for Non-Expenditure Risk Services/Units

These procurement arrangements are similar in many ways to the procurement arrangements previously undertaken for the Interim Arrangements i.e. subject to meeting defined technical standards, eligible Providing Units will qualify to contract for different levels or 'volumes' of service provision with no overall volume cap applied to the arrangements.

However, there are a number of distinct differences relative to the Interim Arrangements, chiefly:

- The procurement will be delivered in a phased manner:
    - Phase 1 will be for the existing 11 services that have previously been procured under the Interim Arrangements[6]. The procurement notice is intended to be issued on 30 November 2017 with contract execution on 1 May 2018.
    - Phase 2 will be for the 3 new services (FFR, FPFAPR, and DRR). The procurement notice is intended to be issued on 30 March 2018 with contract execution on 1 September 2018.
- In the Interim Arrangements, every Providing Unit which qualified under the procurement process and subsequently accepted a contract, signed up to a Framework Agreement. For the Regulated Tariff Arrangements, we intend to use a Qualification System and contracts (rather than a framework agreement structure).
- The procurement will be open to all technologies (including high availability technologies) for all services with the exception of the following five services: FFR, POR, SOR, TOR1 and TOR2.
- For the FFR, POR, SOR, TOR1 and TOR2 services, technologies classified as high availability technologies (whose availability is not linked to energy dispatch) and which therefore represent an expenditure risk, will not be eligible to receive a

[6] However, it will be open to a broader range of technologies, as more technologies will have proven themselves capable of providing system services in the Qualification Trials Process (QTP)

tariff contract. These high availability technologies will be required to enter a separate volume-capped procurement process for these five services.

- It will be possible for new entrants to qualify for contracts at regular intervals during the lifetime of the arrangements.
- It will be possible for contracted parties to adjust their contracted volumes and other contracted technical parameters during the lifetime of the arrangements.

The TSOs recommend that the Qualification System arrangements should be in place for a minimum duration of 6 years.

In addition, the TSOs recommend that the arrangements allow for new entrants to be invited to apply to join the Qualification System for all 14 services at regular intervals, initially six months after the first procurement of the 3 new services (i.e. March 2019) and at six monthly intervals thereafter. In addition, Providing Units already qualified and holding DS3 System Services contracts under the Regulated Tariff Arrangements may apply to change their contracted parameters when the Qualification System is refreshed. The length of the six month window will be subject to review.

As mentioned above, one of the important recommendations is that technologies classified as high availability technologies (whose availability is not linked to energy dispatch) and which therefore represent an expenditure risk, should not be eligible to receive a tariff contract for the FFR, POR, SOR, TOR1 and TOR2 services. For the avoidance of doubt, we recommend that high availability technologies should be eligible to receive tariff contracts for the other nine services.

At this point in time, we consider that Demand Side Units and certain non-synchronous technologies such as storage (batteries, flywheels etc.) would be classified as high availability technologies[7]. These technologies can be available for services without having any related TSO energy dispatch instruction i.e. their availability is not linked to energy dispatch. As a result of the payment rules, these technologies could be available and eligible for payments for every hour of the year assuming they are not forced out or scheduled out for maintenance, even if the service is not required from those providers at all of these hours. The risk of over-expenditure should there be substantial overinvestment in specific new technologies therefore needs to be managed.

The mechanism by which high availability technologies could qualify for a contract for the five services is set out in the next section.

3.2.2 Competitive Arrangements for Expenditure Risk Services/Units

For the FFR, POR, SOR, TOR1 and TOR2 services only, the TSOs recommend that competitive arrangements be introduced for high availability Providing Units whose availability is not linked to energy market dispatch.

These arrangements would in effect be ‘volume capped’ meaning that an upper limit would be applied to the volume of these system services being procured and for which

[7] The TSOs will decide which technologies are classified as high availability technologies during the procurement process.

prospective service providers would offer a competitive price as part of their tender submission.

We recommend that two separate volume-capped procurement processes be undertaken for the FFR, POR, SOR, TOR1 and TOR2 services. For both processes, we recommend that the price paid for a given DS3 System Service would be capped at the associated regulated tariff rate.

Category 1 (1 Sept 2018 – 1 Jan 2020[8])

- This procurement would cover the period from 1 Sept 2018 – 1 Jan 2020. Successful service providers would need to be in a position to provide the five services for the entire duration of this period from the 1 September contract execution date.

Category 2 (1 Jan 2020 – 31 Dec 2025)

- Contracts will be awarded by 1 September 2018 for delivery of the five services at a future date (e.g. 1 September 2020).
- Successful Providing Units will have until 1 January 2020 to satisfy the criteria for service provision. In the case of new entrants, this provides a period of time for construction / preparation in order to be operational and capable of service provision by that date.

In summary, the Category 2 procurement process allows for delivery of the five services at a future delivery date. This will help to facilitate delivery of new investment which requires certainty of contract award before construction can take place.

The purpose of the Category 1 procurement process is to allow for delivery of the five services for the interim period between the awarding of the Category 2 future delivery date contracts and actual service delivery under those Category 2 contracts.

We consider that 1 January 2020 would be a suitable date for transition between the Category 1 and Category 2 contracts (i.e. end date for Category 1 contracts and start date for Category 2 contracts) but we will consider this further following review of the responses to the on-going Regulated Arrangements Contracts Consultation[9].

Given the competitive nature of these two procurement services, the terms and conditions of the competitively awarded contracts will differ from the other tariff-based DS3 System Services contracts.

[8] We consider that 1 January 2020 would be a suitable date for transition between the Category 1 and Category 2 contracts (i.e. end date for Category 1 contracts and start date for Category 2 contracts) but we will consider this further following review of the responses to the on-going Regulated Arrangements Contracts Consultation.

[9] Regulated Arrangements Contract Consultation: http://www.eirgridgroup.com/site-files/library/EirGrid/DS3-System-Services-Regulated-Contracts-Consultation_final.pdf

For example, they may include different requirements with respect to the percentage of Trading Periods for which contracted Providing Units are required to be available. The upper limit on the volumes of each service to be procured will be published with the tender notice planned for 30 March 2018.

Further consultation will be required on the terms and conditions of these contracts to include the following areas, amongst others:

- Bonding / level of commitment required to ensure future date delivery;
- Stage Checks – regular checks against delivery plan to assess the likelihood of the service provider being able to deliver at the future service provision date;
- Mandatory availability levels of service provision.
- Mandatory provision of multiple services.

3.2.3 Transition period (1 May 2018 to 1 September 2018)

There will be a period between when the Interim Arrangements end (1 May 2018) and the Category 1 volume capped contracts commence (1 September 2018) during which there is a transition period for high availability Providing Units providing the expenditure risk services POR, SOR, TOR1 and TOR2.

The TSOs are considering options to ensure that expenditure is managed during this 4-month transition period.

Options under consideration include:

1. Limiting the number of services for which new high availability units can contract.

2. Allowing unrestricted entry of new high availability units for all services but providing, in the procurement's terms and conditions, for conditional adjustment of tariff rates for all service providers.

Another alternative would be to move the proposed procurement dates.

In the recently published Regulated Arrangements Contracts Consultation[10], we are consulting on how best to manage this transition period.

3.3 Base Tariffs

The tariff rates recommended for the Regulated Arrangements are set out in Table 1.

[10] Regulated Arrangements Contract Consultation: http://www.eirgridgroup.com/site-files/library/EirGrid/DS3-System-Services-Regulated-Contracts-Consultation_final.pdf

Table 1: Recommended Tariff Rates for Regulated Arrangements

Service Name	Unit of Payment	Final Rate €
Synchronous Inertial Response (SIR)	MWs^2h	0.0050
Primary Operating Reserve (POR)	MWh	3.24
Secondary Operating Reserve (SOR)	MWh	1.96
Tertiary Operating Reserve (TOR1)	MWh	1.55
Tertiary Operating Reserve (TOR2)	MWh	1.24
Replacement Reserve – Synchronised (RRS)	MWh	0.25
Replacement Reserve – Desynchronised (RRD)	MWh	0.56
Ramping Margin 1 (RM1)	MWh	0.12
Ramping Margin 3 (RM3)	MWh	0.18
Ramping Margin 8 (RM8)	MWh	0.16
Steady State Reactive Power (SSRP)	MVArh	0.23
Fast Frequency Response (FFR)	MWh	2.16
Fast Post Fault Active Power Recovery (FPFAPR)	MWh	0.15
Dynamic Reactive Response (DRR)	MWh	0.04

The tariff rates shown in Table 1 correspond to the following:

- Existing 11 services: The rates for the existing 11 services recently approved[11] for use during the "roll-over contract" period from 1 October 2017 through 30 April 2018 have been **increased by 5%**.
- 3 new services: The rates for the three services (FFR, FPFAPR, and DRR) to be introduced in September 2018, which were included in the original Interim Tariffs decision paper[12] published in August 2016, have all been **increased by 5%**.

3.4 Contract Certainty

With regards to the level of contract certainty afforded to service providers, our recommendations broadly cover two main elements:

- Contract term and duration of the arrangements; and

[11] In May 2017, we published a consultation paper outlining the DS3 System Services tariff rates that we were proposing to apply to the existing Interim Framework Agreements for the 11 services that are being extended to the end of April 2018. Following consideration of the responses to the consultation, we submitted a recommendations paper to the SEM Committee. The Regulatory Authorities reviewed the TSOs' consultation paper, stakeholder responses and the TSOs' recommendations paper. Following this review, the SEM Committee published a decision paper on 21 July 2017 approving the tariff rates as set out in the TSOs' recommendations paper for the "roll-over contract" period from 1 October 2017 through 30 April 2018.

[12] DS3 System Services Interim Tariff Rates Decision Paper: http://www.eirgridgroup.com/site-files/library/EirGrid/DS3-System-Services-Decision-Paper-on-Interim-Tariffs-FINAL.pdf

- TSO termination rights.

We recommend that different approaches to contract certainty should be adopted for those contracts awarded under the tariff arrangements and those contracts awarded under the separate volume-capped competitive procurement processes. These recommended approaches are set out in the following sub-sections.

3.4.1 Contract Certainty for Tariff Arrangements

As previously described in Section 3.2, for the Regulated Tariff Arrangements, we intend to use a Qualification System and contracts (rather than a framework agreement structure as was used for the Interim Arrangements).

The term of the Qualification System will be set as being open-ended, allowing it to remain in place until the SEM Committee decides to introduce longer term market mechanisms (e.g. auctions) for DS3 System Services.

However, the TSOs recommend a commitment be given that the Qualification System arrangements will remain in place for a minimum duration of 6 years.

The TSOs would have the right to terminate individual (or all) contracts with 1 year's notice. However, we would not envisage using this termination right unless there were exceptional circumstances such as a decision by the SEM Committee to end the arrangements early. The TSOs had a similar right under the Harmonised Ancillary Services (HAS) arrangements but never invoked it during the lifetime of those arrangements.

3.4.2 Contract Certainty for Competitive Arrangements

The TSOs are of the view that the contract certainty conditions set out above for the Tariff Arrangements are not appropriate for use in the contracts awarded under the separate volume-capped competitive procurement processes.

In particular, the TSOs consider it appropriate that the TSO termination rights should be different. We recommend that the TSOs would not have an unconditional right to terminate the contracts. However, it would still be necessary to retain the TSOs' right to terminate a contract for consistent poor performance or a material breach of the contract obligations by the service provider.

For the Category 2 competitive procurement process, which allows for delivery of the FFR, POR, SOR, TOR1 and TOR2 services at a future delivery date, we recommend that the contracts should have a guaranteed minimum term of 5 years commencing on a future delivery date to facilitate new investment where appropriate.

3.5 Price Certainty

3.5.1 Price Certainty for Tariff Arrangements

In order to provide as much price certainty as possible while still ensuring appropriate expenditure controls are in place, the TSOs recommend that the tariff rates should be set once at the beginning of the regulated arrangements and only adjusted if specific conditions are met.

The TSOs consider it prudent that a conditional review of the tariff structure (and associated scarcity scalar structure) should be initiated during the term of the regulated arrangements under the following conditions:

- Subject to a tolerance, the TSOs would have the right to adjust tariffs and/or scarcity scalar values on a quarterly basis (i.e. every 3 months) if over-expenditure occurs for reasons other than high wind conditions subject to Regulatory Authority approvals;
- Subject to Regulatory Authority approvals, the TSOs would have the right to adjust tariffs and/or scarcity scalar values if there is significant under-expenditure in a particular tariff year as this may highlight a potential unbalanced tariff pricing or scarcity scalar structure.

3.5.2 Price Certainty for Competitive Arrangements

We recommend that the contracts awarded to high availability units through a competitive process should not be subject to price uncertainty i.e. contracted parties would have full certainty of the price they would receive for provision of the five services for the full duration of their contract.

3.6 Scarcity Scalar Framework

The TSOs recommend that temporal scarcity scalars should be used to ensure that monies are targeted toward service providers that are available during times of scarcity in a manner that is technology neutral.

We recommend that scarcity scalars be applied on a 'stepped' basis, with the values of the scalars linked to the SNSP level in a given trading period as measured in the National Control Centres and made public[13].

We recommend that a scarcity scalar design be separately applied to three groups of System Services:

- The 11 existing System Services (SIR, POR, SOR, TOR1, TOR2, RRS, RRD, RM1, RM3, RM8, SSRP);

[13] The SNSP metric indicates the ability to operate the power system safely, securely and efficiently with high levels of renewable generation. A higher allowable percentage indicates that a greater amount of electricity demand can be supplied by wind and solar generation

- FFR; and
- FPFAPR and DRR.

We recommend that the scarcity scalar design illustrated graphically in Figure 2 with the parameters set out in Table 2 be used in the Regulated Arrangements.

This scarcity scalar design and associated parameter set is chosen such that total expenditure in the 2019/20 New Providers base case is €220 million. The budget cap is €235 million, but €15 million is reserved to cover the additional expenditure that could arise as a result of the SEM Committee decision to pay based on the higher volumes arising from a unit's market position or physical dispatch position, and to cover the cost of the Qualification Trial Process.

The main changes relative to the scarcity scalar design consulted on are as follows:

- We recommend that FFR be paid at the base tariff rate for SNSP levels between 50% and 60%. In the consultation paper, we had proposed no payment below 60%.
- We recommend a downwards adjustment of the scarcity scalar values to apply above 60% and 70% SNSP levels to offset the 5% recommended increase to the base tariff rates and the additional expenditure arising from FFR payments applying at the lower 50% SNSP level.

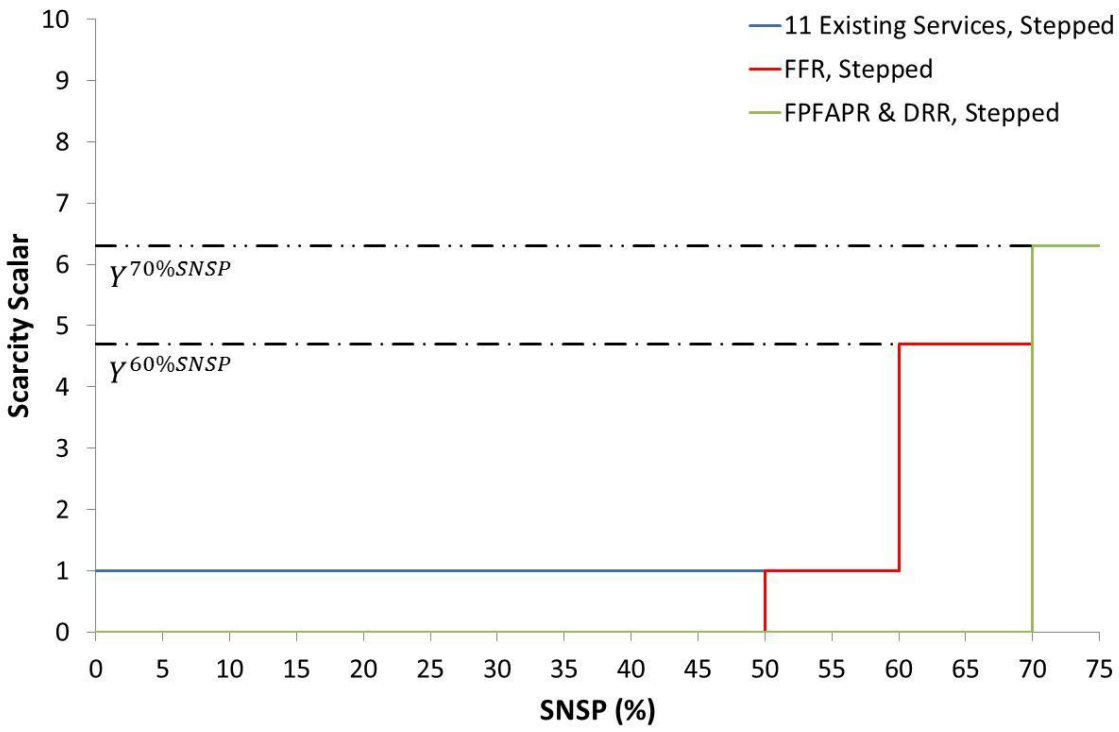

Figure 2: Recommended scarcity scalar design

Service	Scalar 0% - 50% SNSP	Scalar 50% - 60% SNSP	Scalar 60% - 70% SNSP	Scalar 70% - 75% SNSP
11 Existing Services	1	1	4.7	6.3
FFR	0	1	4.7	6.3
FPFAPR & DRR	0	0	0	6.3

Table 2: Recommended scarcity scalar parameters

3.7 Market versus Physical Dispatch Position

The SEM Committee decision on the DS3 System Services procurement design provided the following direction with regard to determining the amount that a system service provider should be paid in any given trading period: "*The SEM Committee has decided that a provider with a system services contract will be paid for the volume of the service that has actually provided or made available in that trading period to the TSO regardless of the TSO's real-time requirement for that service. The higher of a unit's market position or physical dispatch will be used to determine the available volume.*"

The Regulatory Authorities' DS3 Project Board meeting on 4 July 2016 approved the TSOs' proposal to use the Final Physical Notification (FPN) as the appropriate market position in calculating a unit's available volume for system service provision.

Implementation of the proposed payment arrangements by the TSOs will require consideration of a broad set of issues including the different nature of the 14 services, I-SEM/DS3 System Services interactions, and settlement calculation design.

Figure 3 shows the TSOs' recommended high-level plan of action for development and implementation of the proposed new payment arrangements.

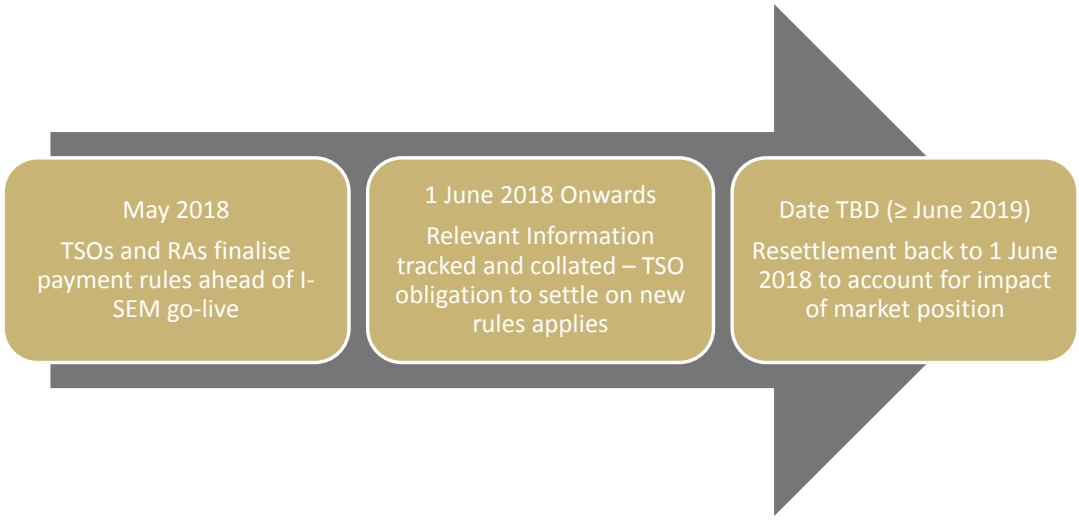

Figure 3: High-level plan for implementation of the payment ruleset

The TSOs will work with the Regulatory Authorities to develop the payment rules ahead of I-SEM go-live on 23 May 2018. A plan for this work is currently being developed. There will be a need for stakeholder engagement activities during the ruleset development. It is intended that market participants will know the final payment rules ahead of I-SEM go-live and will therefore be in a position to reflect the impact of these rules when formulating their energy bids.

Once the ruleset is finalised, the TSOs recommend that it be applied from 1 June 2018. From this date onwards, the TSOs will endeavour to track and collate all of the relevant information needed to implement the ruleset. The date chosen is 1 June 2018 as opposed to 23 May 2018 as such a major change to settlement is not possible to deliver mid-month (settlement is conducted on a calendar month basis).

Given the time required to deliver the IT Project necessary to facilitate settlement under the new rules, the TSOs propose to conduct a re-settlement exercise (accounting for the impact of the market position) that will cover the period back to 1 June 2018 following completion of the IT project. This resettlement exercise is not expected to occur before June 2019. The plan for resettlement will be communicated to stakeholders when the ruleset is finalised ahead of I-SEM go-live.

4 Considerations and Rationale for Recommendations

4.1 Introduction

In this Section, we explain the rationale for the TSOs' recommendations previously set out in Section 3 including the main considerations in the context of the key issues raised in the consultation responses.

We begin in Section 4.2 by describing the set of guiding principles we have used in coming to our recommendation on the DS3 System Services Regulated Arrangements design. Following on from this, we provide a high-level overview of the key issues raised by stakeholders[14] in the consultation as well as our design recommendations under the following broad headings:

- Payment Structure;
- Procurement and Contractual Arrangements.

4.2 Guiding Principles

The design of the DS3 System Services arrangements to incentivise improved performance and investment in system services capability is ground-breaking. There is simply no other comparable model currently in operation in any jurisdiction today. Furthermore, the levels of non-synchronous renewable generation being managed in Ireland and Northern Ireland are at levels that other power systems will only start to experience in the next 10 years or so.

Because there is no comparable model internationally we needed to have some reference perspective and set of guiding principles in coming to our recommendation. To help inform our design choices and recommendations we considered four broad guiding principles. It is only by challenging our design and recommendation choices against these principles that we arrived at our final proposal. The four principles are illustrated graphically at a high-level in Figure 4 and explained in greater detail in the following paragraphs.

[14] Detailed responses to stakeholder queries are provided in Appendix 1.

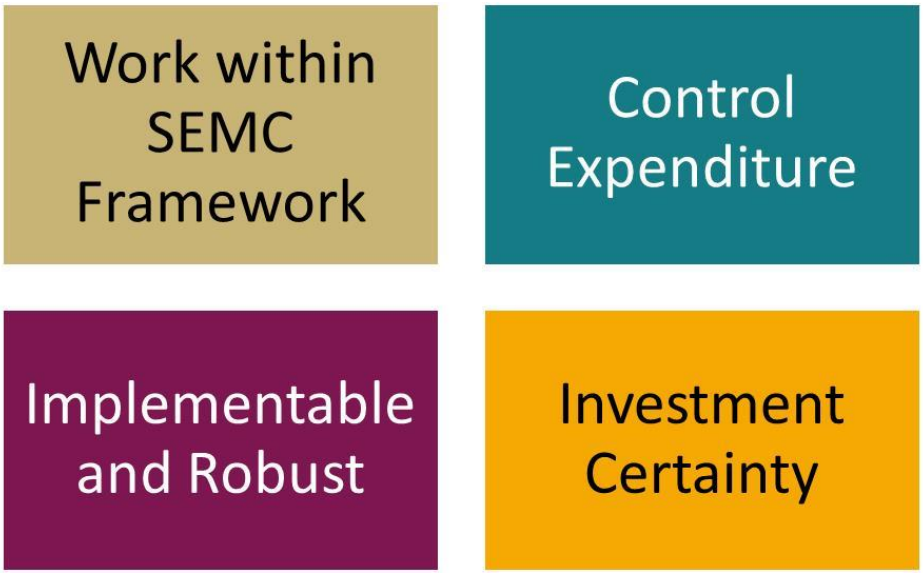

Figure 4: Guiding principles underpinning the high-level design

Principle 1: Work within the SEM Committee framework

The SEM Committee through its decisions in 2014 and 2017 in particular have set out clear guidelines for the design of the DS3 System Services arrangements. These include:

- Ensuring that expenditure can only rise up to €235m per annum;
- Ensuring that the increases in expenditure should be targeted at new investment and/or at times of scarcity rather than paying out additional monies to service providers for their existing system services capability; and
- Payments for all services should be on an "Availability" rather "Dispatch Dependent"[15] basis.

The design of the arrangements set out in this paper has been significantly influenced by the SEM Committee guidelines.

Principle 2: Control Expenditure

The SEM Committee in its March 2017 Future Programme Approach Information Paper clearly set an expectation that expenditure on DS3 System Services:

- Should not exceed €235 million by 2020; and
- Should not exceed an annual cap "glide-path" in the intervening years (the annual cap "glide-path" increases in a linear fashion from 2017).

A core part of our design approach to the tariffs, procurement and contractual frameworks is to ensure that there is appropriate control on expenditure. This is an

[15] "Dispatch Dependent" means that payments are dependent on the TSO dispatching a Providing Unit for services.

absolute requirement of the SEM Committee to protect the interests of the consumer, which the TSOs fully support. It also is a requirement for our own corporate financial governance to ensure that the EirGrid Group does not take an unacceptable risk given we are counterparties to the contracts with all providing units.

Principle 3: Design an implementable and robust solution

The introduction of these arrangements requires the re-working and creation of a range of business processes, systems, tools and contracts. Given the scale of the change it is simply not possible to implement this all at once - nor would it be prudent or required.

To that extent, where possible, a phased implementation strategy has been employed to introduce the principles and the practice, at least in a pragmatic manner first, followed later by a more automated and efficient approach.

The TSOs consider that these recommendations can be implemented for go-live on 1 May 2018 and 1 September 2018. However, pragmatic decisions have been made and it will take some time for all the necessary automation and business process designs to be put in place.

Principle 4: Provide a framework for appropriate investment in system services performance capability

The DS3 System Services arrangements are attempting to incentive a focus on system services performance capability. To the extent the arrangements do not deliver this focus on performance and associated investment they will have failed. Consideration of a range of issues including contract terms and conditions, conditional price reviews, duration of the arrangements, and certainty on new competitive arrangements have all been based on the TSOs' view of what is required to create the appropriate investment environment, while balanced against other considerations such as expenditure control.

Design considerations that clearly and absolutely breached any or all of these distinct principles were dropped. However this absolute breach was not frequent. More generally design choices invariably resulted in satisfying all the principles to varying degrees. In these situations we attempted to use a balanced consideration of the competing challenges against these principles. To the extent possible we have attempted to document these balanced considerations in this recommendation. While we fully appreciate that respondents to the consultation may have a different perspective on the correct balance, we do hope that all respondents will at least appreciate the thought process that the TSOs have undertaken in coming to our final recommendation.

Finally, these arrangements will only deliver for the consumer if all the relevant components of the broader DS3 Programme are successfully completed in parallel. These are critical enablers for successful break-down of the implicit and explicit barriers to allowing the new incentive structures to deliver.

4.3 Payment Structure

Figure 5 illustrates at a high level the recommended payment structure for the DS3 System Services Regulated Arrangements. For each trading period, the payment made to an individual service provider for each service is a function of the tariff rate, the applicable scalars[16], and the service provider's availability for that particular service.

The total aggregated payment in a trading period is the sum of the payments made to all individual service providers for each service. The annual expenditure is calculated as the sum of the trading period payments over the year.

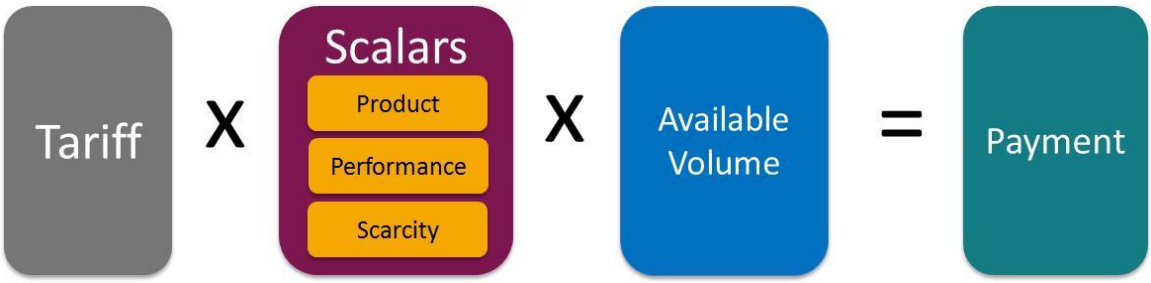

Figure 5: Payment structure for Regulated Arrangements

The base tariff rates, scalar designs, and 'availability' payment rules need to work holistically to ensure that:

- The required flexibilities and levels of performance will be incentivised;
- Sufficient investment certainty is provided to services providers; and
- Expenditure can be managed in line with the SEM Committee framework.

Our recommendations on the Product Scalar designs are set out in the Regulated Arrangements Scalar Design Recommendations Paper, which should be read in conjunction with this paper. Use of a performance scalar has already been established during the Interim Arrangements.

In considering how scalars might impact on future payments the following should be considered:

- The performance scalar is within the control of the service provider. Reliable provision of the service will yield the highest scalar value.
- The product scalars will be based on the characteristics of the plant providing the service and will be known to the service provider at the time of contract execution.

In that context, there was considerable focus in the stakeholder responses to the consultation on the scarcity scalar framework proposed by the TSOs and its interaction

[16] The SEM Committee decision paper SEM-14-108 directed that scalars should be implemented to incentivise flexibility, reliability, value for money and performance. Scalars were categorised under four headings: Performance, Scarcity, Product and Volume. We recommend that a volume scalar should not be implemented in the Regulated Arrangements – this is discussed further in Section 4.4.1.

with the base tariff rates in terms of the level of revenue certainty afforded to services providers.

Some of the core issues raised by stakeholders are discussed in the following sub-sections while the rationale underpinning our recommendations are also presented.

4.3.1 FFR Scarcity Scalar

Concerns were raised by respondents to the consultation that while the arrangements provide reasonably targeted and appropriate investment signals in a normal wind year that there is an unacceptable downside revenue risk to investments for low wind years. Respondents proposed a number of remedies many of which required the extension of FFR payments to levels down to 0% SNSP.

The TSOs accept that the scarcity scalar design consulted on leads to an exposure to investments in low wind years especially where FFR represents a material revenue stream underpinning the investment. In that context, the TSOs consider that modification to the FFR scarcity scalar is warranted.

However, any such change proposed by the TSOs should be linked in the first instance to the technical merits of FFR and not solely for the need to cover downside investment risk.

To this end the “Facilitation of Renewables” studies and subsequent engineering work established that to move above 50% SNSP would require new sources and types of system services. This arises as conventional plant is increasingly displaced by non-synchronous generation in real time operation. This causes two fundamental challenges.

- Finding sources of existing system services that the displaced synchronous generation provided; and
- Finding new types of system services to cover the new system technical scarcities created by having fewer synchronous generators on.

The former services are generally covered in what was called the “Harmonised Ancillary Services” (HAS) arrangements. The latter services are either an increase in the system need for known services or the need for previously unconsidered system services.

These new system services are required to solve technical scarcities arising out of the system being lighter and less synchronous. There is a complex interaction between a range of technical phenomena including reduced inertia, synchronising torque and system wide electromagnetism. These combine to undermine the resilience of the power system that society has come to expect and the economy relies on.

FFR is one of these new services. As the system is lighter, when a disturbance occurs on the power system there is less time for plant to provide their reserve response. In addition, the system-wide Rate-of-Change-of-Frequency (RoCoF) limit needs to be respected.

The “Facilitation of Renewables” study indicates that there is technical benefit in addressing these issues for operational dispatches at SNSP levels of 50% and above.

The techno-economic analysis[17] also indicates that there is economic benefit from being able to have a system RoCoF capability of greater than 0.5 Hz/s above 50% SNSP.

The TSOs acknowledge that the SEM Committee have asked that the counterfactual for the DS3 System Services valuation start from an SNSP level of 60% and a 1 Hz/s RoCoF standard. However, this is only for the purposes of sizing the value of DS3 System Services not its allocation.

To that end, the TSOs are proposing a scarcity scalar for FFR which has a value of 1 between 50% and 60% SNSP (i.e. payment at the FFR base tariff rate). This provides some additional revenue certainty in low wind years. However to keep the system services expenditure within the overall cap, the TSOs are recommending adjusting the scarcity scalar values for all services at SNSP levels above 60%.

4.3.2 Revenue volatility

The need for revenue certainty to underpin investment was a key theme running through the consultation responses. A number of the respondents stated that the scarcity scalar values set out in the consultation were too high and argued that a greater value would be provided to customers if the scalar values were reduced and the overall monies re-allocated through a corresponding increase to the base tariffs. Some respondents expressed the view that under the TSOs' proposed design there would be an unacceptable downside revenue risk to investments for low wind years in particular.

As explained above in Section 4.3.1, we are recommending a modification to the FFR scarcity scalar design to help mitigate this risk (while we are also recommending the use of a 'stepped' scarcity scalar for all 14 services) but we acknowledge that this alone will not offset it. Therefore we have also considered the interaction between the value allocated to the base tariffs and the scarcity values. In doing so, we have been guided by the principles set out in Section 4.2.

In particular, the SEM Committee has provided clear guidance to the TSOs that increases in expenditure should be targeted at new investment and/or at times of scarcity rather than paying out additional monies to service providers for their existing system services capability.

Based on this consideration, while seeking to balance it against the importance of providing a framework for appropriate investment in system services performance capability, we are recommending an increase of 5% to the base tariffs set out in the consultation paper for all 14 services. In turn, we are recommending that the scarcity scalar values published in the consultation, which were 6.2 from 60% - 70% SNSP and 8.2 above 70% SNSP, be reduced to 4.7 for SNSP levels between 60% and 70%, and to 6.3 for SNSP levels above 70%.

The impact of these changes, combined with the FFR scarcity scalar changes described in Section 4.3.1, on expected overall expenditure is set out in the next subsection for a range of scenarios.

[17] 2013 Value study

4.3.2.1 *Results of additional modelling analysis*

Figure 6 shows the updated results of our modelling for the various 2019/20 portfolio and wind scenarios. These results reflect our recommended changes to the scarcity scalar design that we consulted on, namely:

- We recommend that FFR be paid at the base tariff rate for SNSP levels between 50% and 60%. In the consultation paper, we had proposed no payment below 60%.
- We recommend a downwards adjustment of the scarcity scalar values to apply above 60% and 70% SNSP levels to offset the 5% recommended increase to the base tariff rates and the additional expenditure arising from FFR payments applying at the lower 50% SNSP level.

Although the budget cap is €235 million, €15 million is reserved to cover the additional expenditure that could arise as a result of the SEM Committee decision to pay based on the higher volumes arising from a unit's market position or physical dispatch position, and to cover the cost of the Qualification Trial Process. Therefore, the baseline of '1' for Normalised Expenditure shown in the graph represents spend of €220 million, while the 'budget cap' shown in black is set at approximately 1.07 and represents spend of €235 million.

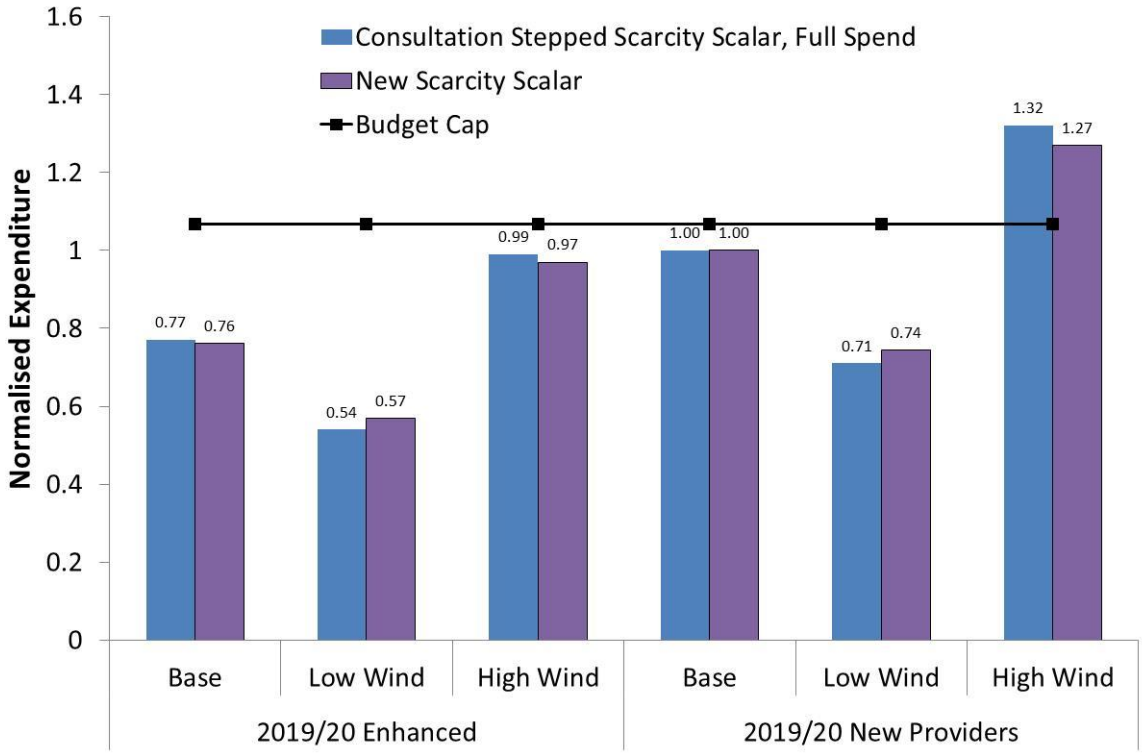

Figure 6: Normalised expenditure (normalised to €220m) for various scenarios

Our recommended scarcity scalar design reduces expenditure volatility relative to the design set out in the consultation. We acknowledge that there remains the potential for large variations in expenditure from year to year. Given the linkage of payments to SNSP

levels, the wind profile and associated capacity factor in particular will have an influence on the outturn expenditure.

In that context, it is important to point out that the low wind year is based on a 24% wind capacity factor, which is significantly lower than the 31% wind capacity factor assumed in the base case. By contrast, a 33% capacity factor was assumed in the high wind scenario.

The wind profile with the 24% wind capacity factor is based on that observed in 2010. The 2010 wind capacity factor is considerably lower than that observed in other years that have been examined (see Table 3 in Section 4.3.2.2). While this should not necessarily be regarded as worst case, service providers can take a view of the likelihood of the wind conditions in 2010 being repeated in the future.

To assist with this process, the level of downside risk to service providers as well as the risk of over-expenditure relative to the SEM Committee's annual cap are explored further in the next section.

For information, additional modelling results including expenditure per service results and normalised expenditure per technology type results are included in Appendix 4.

4.3.2.2 Volatility analysis

We have used the results of the modelling conducted on the low, base, and high wind scenarios and, following some interpolation/extrapolation[18], applied them to the historic wind years of 2005 through 2016. This analysis shows that:

- System services expenditure over a 5 year period is highly unlikely to exceed the SEM Committee cap; and
- That there is asymmetric expenditure between low and high wind years.

Figure 7 illustrates the results of the analysis while Table 3 shows the annual wind capacity factors for the period between 2005 and 2016 inclusive for which the analysis was conducted.

[18] We used linear interpolation/extrapolation but we acknowledge that the relationship between wind capacity factor and expenditure is likely to be more complex.

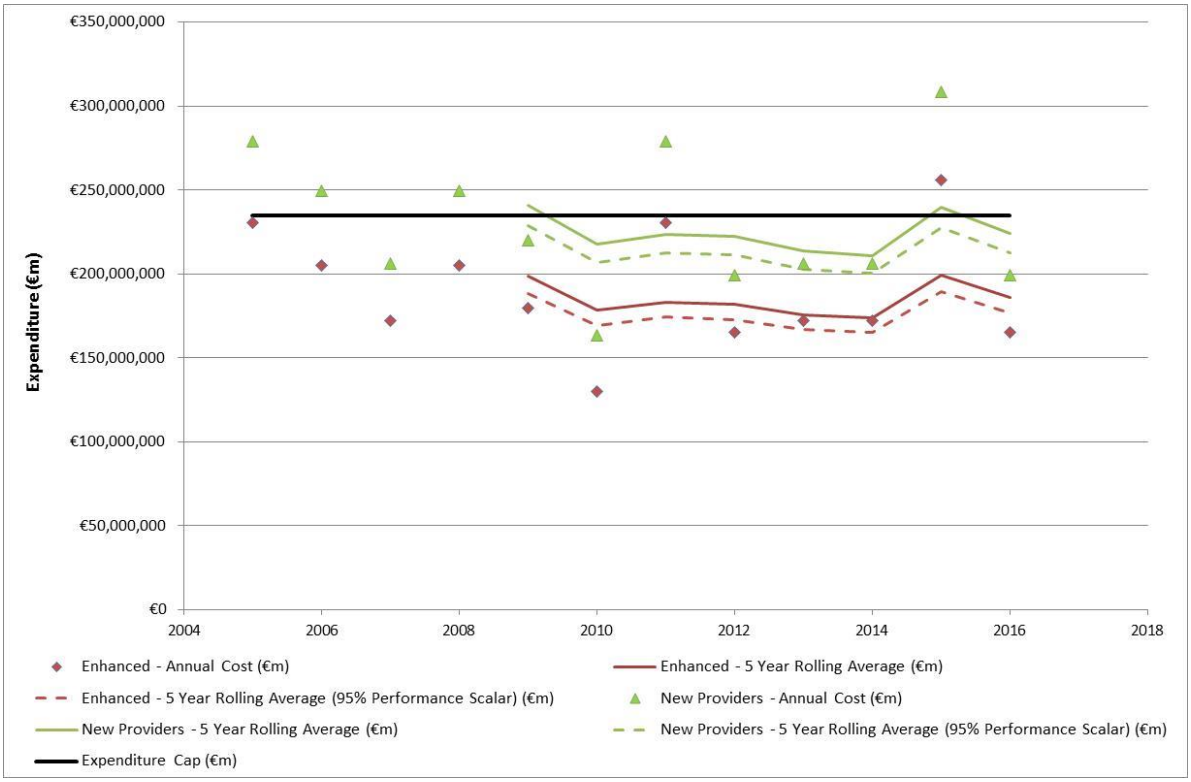

Figure 7: Assessment of expenditure levels based on historic wind capacity factors

Year	Wind Capacity Factor (%)
2005	33%
2006	32%
2007	30%
2008	32%
2009	31%
2010	24%
2011	33%
2012	29%
2013	30%
2014	30%
2015	34%
2016	29% [Provisional]

Table 3: Annual wind capacity factors, 2005 - 2016[19]

The steps taken in conducting the analysis can be summarised as follows:

- We took the 24%, 31%, and 33% capacity factor wind year expenditure levels;

[19] The 2005 – 2014 wind capacity factors are all-island values. The 2015 and 2016 wind capacity factors are based on Ireland wind only with the 2016 value only provisional at the moment. However, the Ireland and Northern Ireland wind capacity factors are usually very similar, so these values can be considered as a good proxy for the island as a whole.

- We interpolated to produce possible expenditure levels for other wind capacity factors for both the Enhanced and New Providers portfolio scenarios;
- We applied the results to the historic annual outturn wind capacity factors seen in the period 2005 – 2016;
- We calculated the rolling 5 year average expenditure for both portfolio scenarios and two performance scalar scenarios as follows:
    - Perfect performance by all service providers i.e. Performance Scalar = 1;
    - Less than perfect performance by all service providers i.e. Assumed Performance Scalar = 0.95 (we believe this is reasonable given a high-level look back at performance scalars to date under the Interim Arrangements).

In the New Providers portfolio scenario, the expenditure cap would be exceeded in a number of years. However, the rolling 5 year average expenditure is less than the cap for the bulk of the time and is always less than the cap if a performance scalar of 0.95 is assumed.

There are no issues with the Enhanced portfolio.

With regard to downside risk for investors, as can be seen in Figure 7 the expenditure levels for the 2010 low wind year (capacity factor of 24%) are significantly lower than other years. As previously stated, service providers can take a view of the likelihood of the wind conditions in 2010 being repeated in the future.

With relation to the likelihood of over-expenditure actually materialising in future as a result of high wind conditions, in our view this is low for the following reasons:

- Outturn Service Provider Portfolio
    - There are a number of potential ways that the portfolio of System Services providers may evolve. Different portfolios of service providers will likely result in different system services volumes. Consequently, two diverse 2019/20 portfolios were modelled in an effort to understand the likely volumes for a variety of potential eventualities – the Enhanced portfolio scenario and the New Providers portfolio scenario.
    - As can be seen in Figures 6 and 7, the risk of significant over-expenditure occurring as a result of high wind conditions arises predominantly for the New Providers portfolio due to the much larger quantity of “high availability” technologies assumed in that portfolio. The studies show a much smaller over-expenditure risk exists for the Enhanced portfolio.
    - It is likely that the portfolio that develops over the coming years will ultimately fall somewhere between the two portfolios studied. As a result, the risk of high wind conditions resulting in over-expenditure to the significant extent seen in the New Providers case could be considered low.

- Performance Scalar
    - The DS3 System Services arrangements include a performance scalar which incentivises high levels of performance by ensuring lower payments are paid for lower levels of performance.
    - We assumed perfect performance[20] for all service providers (for all services) in the analysis we carried out to inform development of the tariff framework. The expenditure levels shown in Figure 1 are reflective of this perfect performance assumption.
    - In reality, as we have seen to date throughout the Interim Arrangements, performance scalars with a value less than 1 will apply for many service providers.
    - This means that overall payments to service providers could be expected to be lower than the estimates set out in Figure 6. For example, if an average performance scalar of 0.9 were to apply to all services and service providers, then expenditure in the New Providers high wind scenario would be €28m lower than that shown in Figure 6 (i.e. the over-expenditure would reduce from €44m to €16m).

- Likelihood of a high wind year occurring
    - Table 3 shows the annual all-island wind capacity factor[21] for every year between 2005 and 2016 inclusive.
    - The average wind capacity factor was 30.6%, which is lower than our base case assumption of 31%.
    - In our view, based on Table 1, the capacity factor might reasonably be expected to reach our high wind scenario assumption of 33% 1 year in every 5 years.

In summary, for the reasons set out above, the likelihood of over-expenditure arising as a result of high wind conditions in any particular year is low.

Our recommendations on the use of conditional reviews set out in the next section are based on this analysis.

4.3.2.3 Conditional Reviews

For the non-competitively awarded contracts, the TSOs consider it prudent that a conditional review of the tariff structure (and associated scarcity scalar structure) should be initiated during the term of the regulated arrangements under the following conditions:

[20] Service providers with perfect performance receive a performance scalar of 1.

[21] These are the capacity factor values after dispatched-down energy has been added back in i.e. they reflect the underlying wind conditions as opposed to the level of wind that was accommodated on the system in each year. We believe this approach is prudent in considering the likelihood and scale of possible over-expenditure.

- Subject to a tolerance, the TSOs would have the right to adjust tariffs and/or scarcity scalar values on a quarterly basis (i.e. every 3 months) if over-expenditure occurs for reasons other than high wind conditions subject to Regulatory Authority approvals. We would not envisage having to invoke this clause but the ability to do so is needed should circumstances arise that would challenge our ability to control expenditure;
- Subject to Regulatory Authority approvals, the TSOs would have the right to adjust tariffs and/or scarcity scalar values if there is significant under-expenditure in a particular tariff year as this may highlight a potential unbalanced tariff pricing or scarcity scalar structure.

The TSOs consider that over-expenditure as a result of wind conditions in one year would likely be offset by under-expenditure in another year. The TSOs have also conducted analysis on the magnitude of any additional consumer benefit that might arise from increased wind energy due to a high wind capacity factor.

As can be seen from the analysis described in Appendix 3, there is an estimated €20.5 million additional consumer benefit associated with a high wind capacity year of 33% in 2020.

Therefore, to provide greater investment certainty, and in the context of the analysis previously presented in Section 4.3.2.2, the TSOs recommend that over-expenditure as a result of a high annual wind capacity factor should not be considered as cause to initiate a conditional review of the regulated tariff structure.

4.3.3 Use of 'operational SNSP'

Respondents expressed concerns about their ability to predict the actual or 'operational' SNSP level for a given trading period with some commenting that this might present issues with regard to how they would bid into the day-ahead, intra-day and balancing markets in the new I-SEM arrangements.

Some respondents indicated that there may be merit in considering use of an ex-ante or market-determined SNSP, with this SNSP effectively committed for the purposes of settlement of DS3 System Services before final gate closure in I-SEM (but not used for the operation of the power system).

The TSOs acknowledge and agree with respondents that the day-ahead, intra-day and balancing markets in the I-SEM will require an estimation of SNSP to formulate appropriate bidding strategies. In addition the use of scarcity scalars does lead to increased volatility in the short term particularly when the SNSP is operating near scarcity scalar thresholds (e.g. 60% SNSP).

However the TSOs are recommending that there be no change to the use of the operational SNSP metric. This is for the following reasons:

- The TSOs are recommending the use of a stepped rather than linear scarcity scalar. This design mitigates any uncertainty in the price paid for a service when the SNSP exceeds a given threshold. Therefore, in the hour-ahead timeframe,

the only periods when there might be uncertainty in the short term DS3 System Service revenues are those periods where SNSP transitions from above to below or below to above 60% SNSP and 70% SNSP. The frequency of these transition periods is limited.

- The DS3 System Services arrangements are designed to drive improved behaviours in existing providing units as well as facilitate appropriate investments in new performance capability to efficiently meet public policy objectives. These are long term signals for the operational capability of the power system to manage high renewables. The use of the operational SNSP is the best metric to represent this. More specifically the use of ex-ante market-derived SNSP metrics allow for the possibility of a divergence between this estimate and what actually occurs in operations. Were this to arise the DS3 System Services revenue would be going to units that would not be contributing to overall system resilience at the time. While this is not a significant issue if there is little divergence, if material, it would undermine the efficacy of the whole DS3 System Service arrangements. Given the level of re-dispatch away from market outcomes in today's SEM market the TSOs consider that it would not be appropriate to consider using an ex-ante market assessment of SNSP for settlement at this time. Were the I-SEM arrangements to show that ex-ante market schedules were close to real time operational needs and that DS3 System Services revenues were being appropriately bid into the various markets this could be looked at again.

4.3.4 Market versus Physical Dispatch Position

The majority of respondents to the consultation did not agree with the TSOs' proposal to delay the implementation of taking the higher of a service provider's market position or physical dispatch, to determine the available volume of a service, for a minimum of 12 months post I-SEM go-live.

The TSOs understand the concerns of market participants in this regard and we have therefore committed to working with the Regulatory Authorities to develop the payment rules ahead of I-SEM go-live. It is intended that market participants will know the final payment rules ahead of I-SEM go-live and will therefore be in a position to reflect the impact of these rules when formulating their energy bids.

Once the ruleset is finalised, the TSOs recommend that it be applied from 1 June 2018[22]. From this date onwards, the TSOs will seek to track and collate all of the relevant information needed to implement the ruleset. The TSOs will then conduct a re-settlement exercise (accounting for the impact of the market position) that will cover the period back to 1 June 2018 when the settlement system changes have been implemented.

In that regard, respondents to the consultation also expressed concerns about timelines for resettlement and queried why a delay of 12 months or longer may be required for its implementation. The concept of paying for services based on the higher of a service

[22] The date chosen is 1 June 2018 as opposed to 23 May 2018 as such a major change to settlement is not possible to deliver mid-month (settlement is conducted on a calendar month basis).

provider's market position or physical dispatch will drive fundamental changes to the TSOs' settlement systems. Following finalisation of the ruleset ahead of I-SEM go-live, there will be a significant period of time required to deliver the IT Project necessary to facilitate settlement under the new ruleset. The exact timeline for completion of the IT project will not be known until the scope is finalised.

While this resettlement exercise is not expected to occur before June 2019, we will endeavour to complete the IT Project and to conduct resettlement as quickly as possible. In that context, the plan for resettlement will be communicated to stakeholders when the ruleset is finalised ahead of I-SEM go-live.

4.4 Procurement and Contractual Arrangements

In this section, we set out the rationale underpinning our recommended procurement proposals, which were described in detail in Sections 3.2 and 3.4.

In particular, we have focused on:

- Our recommendations arising as a result of the need to manage over-expenditure risk due to high availability technologies; and
- Our recommendations in relation to contract certainty and contract structure.

4.4.1 Over-Expenditure Risk due to High Availability Units

The 'availability' payment definition means that some types of service providers could be eligible for payments for every hour of the year assuming they are not forced out or scheduled out for maintenance, even if the service is not required from those providers at all of these hours. The scale of overall payments will therefore increasingly depend on the portfolio of service providers and the expected availability of individual service providers.

With tariff arrangements that place no limit on the volume that can be added to the procurement framework, there would be a risk of over-expenditure should there be substantial overinvestment in specific new service-providing technologies.

In the consultation paper, we set out the following three mechanisms by which the risk of over-expenditure could be mitigated:

- Volume Scalar: A volume scalar could be introduced on a trading period basis. This would mean that the payments for a specific volume of service in a trading period would be pro-rated across all available providing units.
- Availability Definition: After a certain point, a review could be conducted of the definition of 'availability' for any further new entrants with high 'availability' levels.
- Procurement Process: A limit may be placed on the volume of high availability technologies that can qualify to provide services.

The majority of respondents agreed with the TSOs' view that there is a need to mitigate the risk of over-expenditure as a result of over investment by high availability technologies.

However, some stakeholders stated there should be no restrictions on a service provider's availability, that high service availability is a strength of a technology class rather than a weakness, and that any mechanism to limit the volume of services provided by high availability service providers would be discriminatory and therefore not technology neutral.

The TSOs have to date and will continue to adopt a technology neutral approach in so far as possible. While we agree that there is a benefit arising from a service provider having high service availability, we have a requirement to manage the risk of over-expenditure as a result of over investment by high availability technologies.

Our recommendation therefore is that the risk of over-expenditure arising from over-investment in high availability technologies should be managed through the procurement process.

Of those who agreed with the principle of managing the risk of over-expenditure, the majority also favoured doing this through the procurement process. There was little support for implementation of a volume scalar or for making changes to the availability definition.

In addition to mitigating the risk of over-expenditure, this procurement approach also has the benefit of providing greater investment certainty for those high availability service providers that are successful in the procurement process.

In summary, as set out in Section 3.2, we recommend that the procurement process should be divided into two distinct categories:

- **Tariff Arrangements for Non-Expenditure Risk Services/Units**
    - These arrangements are 'Volume Uncapped' meaning that a volume limit is not applied to any of the system services being procured. Regulated tariff rates will apply for service providers that receive a contract under these arrangements.
- **Competitive Arrangements for Expenditure Risk Services/Units**
    - There arrangements are 'Volume Capped' meaning that an upper limit will be applied to the volume of relevant system services being procured and for which prospective service providers will offer a competitive price as part of their tender. Volume Capped procurement is proposed to apply to high availability Providing Units whose availability is not linked to energy market dispatch. It will apply to a subset of system services only.

The result of splitting the procurement process is that technologies classified as high availability technologies (whose availability is not linked to energy dispatch) and which therefore represent an expenditure risk, would not be eligible to receive a tariff contract for the FFR, POR, SOR, TOR1 and TOR2 services.

We have limited this to these five services only as our analysis suggests that these services present the highest expenditure risk due to their high value and the ability of high availability technologies to provide these services in particular. The high availability technologies would therefore need to compete for a contract for provision of these five services under this proposal. For the avoidance of doubt, we recommend that high availability technologies should be eligible to receive tariff contracts for the other nine services.

In the next section, we discuss the rationale underpinning our recommendation on the contract durations for each of the two contract types.

4.4.2 Contract Certainty and Structure

An important issue raised by a number of respondents to the consultation relates to the level of contract certainty afforded to new investment, particularly where that investment requires a period of time for construction/delivery.

Most international ancillary services markets focus on procuring service capability from existing providers in the most efficient manner as opposed to specifically incentivising investment in needed new service capability as is the case for DS3 System Services (clearly the DS3 System Services arrangements are also aiming to procure service capability in an efficient manner).

As a result, our arrangements need to provide certainty to prospective service providers that should they proceed to invest and construct/enhance their providing unit, that they will have a contract for service provision for a known defined period of time. We consider that our recommended procurement arrangements will provide the required level of certainty, for the reasons set out in the following subsections.

4.4.2.1 Tariff Arrangements

In the Interim Arrangements, every Providing Unit which qualified under the procurement process and subsequently accepted a contract, signed up to a Framework Agreement. For the Regulated Tariff Arrangements, we intend to use a Qualification System and contracts (rather than a framework agreement structure).

The TSOs are recommending that the Qualification System arrangements should be in place for a minimum duration of 6 years. However, we plan to establish the Qualification System as “open-ended” to allow for the arrangements to continue should there be a regulatory decision to do so in the future. On 26 September 2017, the TSOs published a consultation paper[23] on the DS3 System Services Regulated Arrangements Contracts. The paper also contains information on the proposed procurement process.

[23] Regulated Arrangements Contract Consultation Paper - http://www.eirgridgroup.com/site-files/library/EirGrid/DS3-System-Services-Regulated-Contracts-Consultation_final.pdf
Draft Ireland Regulated Arrangements Agreement - http://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid-DS3-System-Services-_Regulated-Arrangements_draft.pdf

We believe that these arrangements would provide a reasonable degree of confidence to investors that the contracts would be in place for a minimum time period. In that context, developers could enhance the capability of existing plant or invest in a new plant in the knowledge that if they meet the technical standards for the services (and their technology is proven) they will be awarded a contract.

We acknowledge that these arrangements may not provide the investment certainty over the longer periods (e.g. 15 – 20 years) sought by some respondents to the consultation. In such cases, investors would have to take a view on the likelihood of these services being required following the conclusion of the arrangements and what might be paid for these services, and/or wait for the introduction of longer-term market mechanisms currently being considered by SEM Committee.

4.4.2.2 Competitive Arrangements

As previously set out in this paper, the principal reason for recommending the introduction of competitive procurement for the FFR, POR, SOR, TOR1 and TOR2 services is to manage the risk of over-expenditure arising from over-investment in high availability technologies.

However, our recommended competitive approach also has the benefit of providing greater investment certainty for those high availability service providers that are successful in the procurement process.

For our "Category 2" competitive procurement process which allows for delivery of the services at a future date, it will be important for the TSOs to ensure that 'real' projects are awarded contracts and that, having been awarded contracts, that the level of commitment is such that these projects actually deliver when they are supposed to deliver. A number of respondents to the consultation discussed this in their responses in the context of the TSOs having to manage over-expenditure while still providing developers with certainty of contract/revenue following commissioning and testing of a new Providing Unit.

It is also important that the TSOs get the services they require in terms of the characteristics of the service (e.g. dynamic vs. static response) and that the services are available when needed by the TSOs (this is likely to necessitate minimum availability standards, for example). Given the competitive nature of the procurement, the terms and conditions of the competitively awarded contracts will differ from the other tariff-based DS3 System Services contracts.

We will need further stakeholder engagement on the various elements of the detailed procurement process design and contract structure before commencement of the procurement process.

For the competitive arrangements for expenditure risk services/units, we are recommending that contracts aimed at securing service provision at future delivery dates

should have a guaranteed minimum term of 5 years commencing at the future delivery date in order to facilitate new investment where appropriate. We are of the view that contracts significantly longer than 5 years would not be appropriate as it could have the effect of locking out new lower cost technologies that may arise in the coming years.

5 Next Steps

This paper provides stakeholders with information on our recommendations in relation to the Regulated Arrangements framework to apply for the period from 1 May 2018. It has been submitted to the SEM Committee to inform their decision on the various elements of the design.

The SEM Committee's decision paper (due to be published in parallel with this paper) will set out the final decisions on the design to be implemented by the TSOs. The SEM Committee decision on certain elements of the design may differ in parts to our recommendation.

The TSOs will assess the final SEM Committee decision and develop a plan to implement the various aspects of the arrangements as soon as possible.

We envisage that there will be a number of steps involved in the implementation phase. Some of the key next steps are as follows:

- Translation of decisions into contracts for non-volume capped tariff arrangement.
    - The on-going contracts consultation being held by the TSOs focuses on the contractual arrangements to be used for the non-volume capped tariff arrangements. Decisions on the following items, amongst others, will need to be reflected in the final contracts:
        - Scarcity scalar framework;
        - Contract duration;
        - Price certainty and conditional reviews.
- Consultation on contracts for volume-capped competitive arrangements.
    - A consultation is likely to be required on the contracts to be used for any volume-capped procurement exercise aimed at managing the risk of over-expenditure arising from over-investment in high availability technologies. The SEM Committee decision on the nature and timing of such a procurement process will help inform what needs to be covered in that consultation.
- Market versus Physical Dispatch Position
    - The TSOs are working with the Regulatory Authorities to develop a plan for developing the payment rules ahead of I-SEM go-live on 23 May 2018. There will be a need for stakeholder engagement activities during the ruleset development.
    - It is intended that market participants will know the final payment rules ahead of I-SEM go-live and will therefore be in a position to reflect the impact of these rules when formulating their energy bids. The plan for resettlement will be communicated to stakeholders when the ruleset is finalised ahead of I-SEM go-live.

Appendix 1: Stakeholder Views and TSOs' Response

A1.1 Overview

The regulated tariffs consultation covered a wide range of issues and proposals. In total, we asked stakeholders to provide their views on 12 questions. At a high level, the questions can be broadly grouped into the following categories:

- Base Tariffs – The base tariff payment rates to which scalars would be applied in the arrangements.
- Contract Certainty – The term/duration of the contract and the level of certainty provided to service providers in that regard.
- Price Certainty – The level of certainty provided to service providers with respect to changes to the tariff rates and scalar values applied during the course of the arrangements.
- Scarcity Scalar Framework - The framework setting out how service providers' payments change depending on the SNSP level.
- Over-Expenditure Risk due to High Availability Technologies – The mechanisms through which the expenditure risk arising from technologies whose availability is not linked to energy dispatch decisions can be managed.
- Market versus Physical Dispatch Position – The ruleset for determining service providers' payments based on market and physical dispatch positions, and the TSOs' plans for implementation of the ruleset.

In the following sections, we include the questions asked in the consultation for each of the above categories and we provide an overview of the responses received from stakeholders including detailed commentary where appropriate. We also provide the TSOs' response to the stakeholder comments.

A1.2 Base Tariffs

Question 1: Have you any comments on the proposed tariff rates for the Enduring Regulated Tariff arrangements?

There was a significant level of commentary on the tariff rates we proposed to apply in the Regulated Arrangements. The following provides a high-level summary of the comments received:

- Two respondents expressed the view that the tariff rates should be higher for the faster response services, as this would incentivise investment in situations where scalars reduce the effective payment rate.

- One respondent expressed the view that given that the proposed tariff rates are index-linked to the existing tariffs this does show some consistency which provides confidence. However, the respondent also commented that the proposal for conditional reviews of the tariffs creates uncertainty.
- Four respondents commented that as the 11 existing service tariffs were increased by 5.3% for the "roll-over" contract tariffs relative to the original Interim Tariffs decision paper published in August 2016, that a similar increase should apply for the three new services tariffs (to be introduced in 2018) have not also been increased by 5.3%.
- One respondent commented that if base rates are adopted as proposed no indexation will have be applied to the tariff rates from the beginning of the interim arrangements in 2016 to at least 2019 or possibly to 2022. The respondent stated that this is at odds with the recently approved TSOs' recommendation paper to the SEM Committee in relation to Other System Charges for the period 2017-18 where provision was included for an increase of 1.7125% in the charges and rates to adjust for inflation. This follows a similar increase of1.6% in the OSC charges and rates in the previous year.
- One respondent does not support the TSO's proposal to keep the tariff rates fixed for the period of the enduring arrangements and instead seeks a modified version, whereby the base tariff rates increase yearly along an approved trajectory, which may or may not (subject to analysis and consultation) track the SEM committee's glidepath. The respondent states the application of scalars would then bridges the monetary gaps each year to the SEM committee approved glidepath spend.
- One respondent stated that they are comfortable with the retention of the proposed rates, assuming that all of the product scalars are fully applied and fully functioning.
- One respondent stated that the new rates are too low, and that there is insufficient visibility to investors of future revenues on which to make commercial investment decisions on existing or new assets.
- One respondent stated that greater transparency on how regulated tariffs are derived is critical. The respondent commented that a thorough explanation of the tariffs and scalars must be provided in order to build confidence amongst energy generators.
- One respondent stated that the TSOs have not followed the SEM Committee's framework as set out in the Future Programme Approach Information Paper and that the current proposal is detrimental to one of the key benefits of the tariff rates i.e. providing industry stakeholders with confidence in the future trajectory of payments.
- One respondent stated that with the proposed rates, existing providers will not receive clarity that they will receive appropriate remuneration and new providers will not have a mechanism where they can make significant investment.

- One respondent stated that individual service tariffs appear acceptable when complemented by the proposed full spend 'stepped' scalar design and operating under the assumption that higher SNSP will occur over the forthcoming four to six year period and beyond. However the respondent commented that this should be viewed in the context of revenue variability during the contracted period, and the associated impact on commercial certainty.
- One respondent stated that it is difficult to comment on the adequacy of the proposed tariff rates for the Enduring Regulated Tariff arrangements given uncertainty around the development of SNSP and the procurement process.

TSOs' Response

The base tariff rates need to work holistically with the scalar designs and 'availability' payment rules to ensure that:

- The required flexibilities and levels of performance will be incentivised;
- Sufficient investment certainty is provided to services providers; and
- Expenditure can be managed in line with the SEM Committee framework.

The SEM Committee has also directed that increases in expenditure should be targeted at new investment and/or at times of scarcity rather than paying out additional monies to service providers for their existing system services capability. All of these considerations have fed in to our recommendations on the base tariff rates.

Based on our consideration of the arrangements as a whole, we are recommending an increase of 5% to all of the tariff payment rates. We agree with respondents that a small increase in tariff rates alone is not sufficient to deliver the investment required. In that regard, the rates need to be considered in the context of the wider arrangements and in particular the scalar design which pays out multiples of the base tariff rate at higher SNSP levels.

In relation to the comment on inflation and the lack of index-linking of tariff rates, the SEM Committee have directed that tariffs should not be index-linked and we have conducted our modelling and developed the recommended arrangements in that context.

A1.3 Contract Certainty

Question 2: Have you any comments on the TSOs' recommendation that the regulated arrangements be put in place for minimum defined time duration until such a time as there is greater information available on the timeline for implementing a long-term market mechanism for System Services?

The majority of respondents (15) were very supportive of the TSOs' recommendation that the regulated arrangements be put in place for a minimum time duration prior to the implementation of a long-term market mechanism for System Services.

- Of these, two respondents commented that 4 years was the minimum term of arrangements required to give investment certainty to service providers. In both cases comments specifically related to the suitability of term for demand side service providers.
- Four respondents stated that 4-6 years was a suitable term for the regulated arrangements. However, one of those respondents expressed concern that the application of 4-6 year contracts for DS3 services in isolation of consideration of Capacity and Energy revenues could lead to an inappropriate bind rather than a bonus to service providers and that there should be some form of overlap between DS3 policy and the implementation of I-SEM.
- One other respondent expressed the view that the length of contracts should be aligned with the I-SEM CRM term (10 years). Another respondent also suggested 10 years as the minimum term for the arrangements and stated that they do not believe that the introduction of a 'not earlier than' date for competitive arrangements will provide investment clarity for significant contributions to DS3 system services, even in the short or medium term.
- One respondent suggested that the minimum contract length should be 8 years in line with regulatory price control (RIIO). The respondent felt that such a term could facilitate projects with shorter lead-times being brought forward.
- One respondent commented that some older plant that are investing to enhance service provision may not want to be tied to a contract length of 6 years or more for a number of reasons:
    - Plant revenues are linked to 1 year capacity contracts – early retirement may be required;
    - Contracts may prevent plant configurations from being changed during the contract;
    - Older plant performance may degrade.
- The respondent argued that there should be an option to contract for a shorter period of time or change/terminate a unit's contract at set intervals, freeing up volumes for other service providers. This, they stated, could allow new better performing plant to replace retiring plant sooner and improve overall system performance.
- One respondent stated that they not agree with the TSOs' methodology for determining a minimum contract length. They argued that the characteristics of other jurisdictions (revenue from energy markets, capacity payments and ancillary service payments) may result in a contract length being acceptable to investors within that jurisdiction. Further, they stated that each jurisdiction is different and that therefore a more scientific approach is required, that a bottom up approach, similar to the DS3 System Services Finance Arrangements Consultation 2, should be used to determine the length of contract that is required to attract both new and upgrade investments.

TSOs' Response:

In consideration of all the comments received, and with reference to the rationale outlined earlier in this paper, the TSOs are recommending that the procurement be divided into two procurements, the first (Volume Uncapped) to be tariff-based, with arrangements that remain in place for a term of not less than 6 years.

The second (Volume Capped), which will apply to a subset of services for high availability service providers, will include a competition based on price and is proposed to have a guaranteed minimum term contract of not less than 5 years which commences on the date of first service provision.

In relation to comments in relation to shorter contract length, the termination provisions in the Regulated Arrangements contracts are currently being consulted upon and termination provisions will be considered as part of that consultation. Additional comments provided by respondents in relation to Question 2 are dealt with under the response to Question 3.

Question 3: With respect to contract certainty, are there other considerations which we should take account of or other options that we should explore further?

The following provides a high-level summary of the comments received:

- Two respondents commented that the grid connection application process may add significant delay and risk for any new Non-Synchronous technologies (and other technologies) that could otherwise be deployed relatively quickly. One of the respondents argued that the connection process should be amended to prioritise connections that provide a high volume of system services. The respondent also commented that the DS3 procurement process and agreements must also be structured so that longer term developments are assured of DS3 revenue in advance of achieving finance and beginning construction. One of the respondents commented that the exact criteria for the award of an enduring contract with respect to planning, grid connection and go-live date should be clearly stated and is of particular importance to service providers aiming to fund new build units from DS3 System Service revenue streams alone and that the criteria which must be met in order to facilitate a competitive auction should be clearly published to provide some transparency for developers.
- One respondent commented that when considering other jurisdictions, the TSOs should be cognisant of the stability of the regulatory frameworks in such jurisdictions. The respondent also commented that, in other jurisdictions those investing in technologies for the provision of system services often have additional / alternative revenue streams which are either compatible with or viable alternatives to providing systems services e.g. Capacity Market revenues in Great Britain. In the respondent's opinion, both of these help to provide investor confidence in other jurisdictions which is very difficult to achieve in Ireland.
- One respondent commented that the DS3 procurement arrangements do not align with the forthcoming Capacity Remuneration Mechanism (CRM) T-4 auction,

to be held in August 2018, which they suggested has a profound impact on investment risk and is likely to have a similar impact on the cost to customers.

- The respondent noted that a four year contract term would expire before COD of any successful new entrants from the first T-4 CRM, therefore preventing any business case for new generation assets considering contracted revenue sources from both DS3 and CRM to support investment. The respondent commented that to achieve the stated outcomes of "incentivis[ing] flexibility, reliability, value for money and performance" it is imperative that revenue under DS3 and CRM are aligned: for example the current DS3 System Services contract period should be in excess of four years to enable debt financing for new assets. It should also be set at a term that provides sufficient overlap with the T-4 Capacity Auction timing, in order that any CRM bid could be tailored accordingly to take into account DS3 revenue.
- One respondent stated that they do not believe that the proposals set out in the consultation will provide the right signals for investment in fast-acting, flexible generation necessary to deliver higher levels of renewable throughput on the system to meet 2020 national requirements. and believes that a more suitable and necessary approach would be to provide DS3 contracts of durations in line with funding requirements (i.e. at least 10 years) to a limited volume of new providers.
- Two respondents stated that they believed that as much flexibility as possible should be included in the contracting arrangements. Specifically both commented that demand side operators (aggregators) should have scope to add IDSs to their aggregated DSU for DS3 service provision on an ongoing basis, rather than every 6 months and that aggregators should have the flexibility to add new sites to meet a given contract MW number rather than declaring the MPRNs of the demand side unit at tender stage.
- One respondent commented that they agree that the implementation of a stable system services framework would support investor confidence. However they are concerned that the regulated arrangements as proposed may not offer the requisite degree of stability. They noted that they do not support the proposal in the consultation that a lower set of scarcity scalars should be adopted if a minimum contract duration of years is adopted.
- One respondent stated that revenue certainty, subject to meeting performance targets which are under the control of the DS3 plant, is essential. They stated that the Temporal Scarcity scalar with no revenue for FFR when SNSP < 60% introduces significant risks which investors (debt and even many equity providers) will be unwilling to take. This, they felt is particularly true in the first few years of operation when TSO engineers with detailed and confidential system information and forecasts might predict that SNSP will exceed 60% for a reasonable number of trading periods, but when, they argued, there is no existing historical data or equally sophisticated independent analysis to convince traditionally conservative bankers of this. There must be a high probability of such an outcome for debt to be willing to risk lending money.

- One respondent stated that they believe that significant work is still required around the detailed contract design in order to ensure that parties awarded contracts are given sufficient time to deliver but also that these parties are tracked and penalised for non-delivery.
- One respondent stated that the consultation paper does not outline a regime for DS3 which has what is commonly understood to be "contract certainty" given it is not possible to accurately forecast SNSP levels on which DS3 payments are dependent. They suggested that the following measures should be adopted:
    - the term should be up to 10 years
    - the DS3 tariff rates should increase yearly along a published trajectory to 2020 (of in excess of 25% each year), with the scalar values ensuring the bridge the gap between standard payments based on rates and the SEM Committee glide-path amounts. Scalars and tariff rates must be contract terms which must not be subject to change over the term of the contract.
    - Commitment must be given on the details of how SNSP levels will be reported by the TSOs, how the TSOs will call on DS3 services in real time, and how the rationale for daily Interconnector flow decisions will be published.
    - The TSOs should operate a five year rolling DS3 payment regime such that an overspend in total in any one year will not prevent payments being made if there has not been an overspend over the previous five year review period. Such a regime will improve investor confidence.
- One respondent stated that it is difficult for developers of new service providing assets to commit to deliver services in the proposed two phase procurement program as developers may need offer of contract on a mix of existing and new services before they can commit to contracts which would require investment in new assets and believes that the procurement program (both initially and in subsequent rounds) should align contract dates for all 14 services.

TSOs' Response:

With regard to respondents' comments in relation to ensuring longer term developments are assured of DS3 System Services revenue in order to secure finance in advance of beginning construction, the TSOs' proposals include a guaranteed minimum term contract for future delivery service providers, whereby the term of their contract would commence on the date of first service provision.

In relation to respondents' comments that the DS3 System Services procurement arrangements do not align with the Capacity Remuneration Mechanism (CRM) T-4 auction, the TSOs agree that it is important that the Capacity, Energy and DS3 System Services work holistically together for the benefit of consumers. Cognisant of this, the TSOs' proposed arrangements include provisions for longer-term contracts, while the Regulatory Authorities are examining appropriate longer-term market mechanisms.

The proposed arrangements aim to increase the level of flexibility in the procurement process for service providers, by incorporating a six-monthly Qualification System refresh. The TSOs are continuing to assess the needs of specific technologies, such as DSUs, with regard to contracting needs as part of the procurement process.

The proposal in relation to the Temporal Scarcity Scalar for FFR has been modified in light of industry comments. In relation to the setting of scarcity scalars, the TSOs are recommending that they be set based on full payment in 2020 for the New Providers portfolio scenario.

The TSOs acknowledge that further work and consultation is required in relation to the proposed Volume Capped contract design, if the Regulatory Authorities approve its adoption.

In relation to the comment that the two phase programme may pose a difficulty for developers of new service providing assets, the TSOs hold the view that the proposed future delivery (Volume Capped) contracts with a guaranteed minimum term should assuage this concern.

A1.4 Price Certainty

There were three questions (Q4, Q5 and Q6) in the DS3 System Services Enduring Tariffs consultation paper related to the TSOs' proposals that affect price certainty, with specific focus on the TSOs' proposals for conditional reviews.

The stakeholder responses to each of these questions are provided separately below. We then provide a single overall response to the stakeholder responses following the summary of the stakeholder responses to Q6.

Question 4: Have you any comments on the TSOs' recommendation to replace an annual tariff review with a conditional tariff review, or are there alternative approaches that you think are better?

- One respondent agreed with the proposal to use a conditional tariff review as opposed to an annual review. The respondent stated that this would provide more revenue certainty for new investment but could also become a road block in terms of agreeing on the conditions.
- One respondent commented that the concept of conditional tariff review is an improvement and does provide some further degree of certainty compared to the annual tariff review However, the respondent questioned the requirement for the review at all. Finally the respondent stated that consideration should be given to applying the tariff review only to existing plant that have not undertaken major recent investment i.e. exclude from the tariff review those who were previously deemed eligible for the long term contracts.
- One respondent does not believe the structure of tariff reviews is sufficient for providing investment signals. The respondent stated that regardless of the

frequency of tariff reviews, investment cases can only be made with the certainty of a contract with fixed regulated tariffs for the duration of that contract.

- One respondent stated that a conditional tariff review is preferable to an annual review, provided that the frequency of conditional reviews is fixed at no less often and that scalar values are fixed for the duration of the Enduring arrangements. The respondent emphasised the importance of ensuring investors have stability to forecast future revenues and as such all reviews should be light and not lead to significant changes. The respondent believes that significant changes to revenues mid-contract would freeze future investment by increasing risk associated with existing and new assets.
- Two respondents supported the need for an annual tariff review but aligned with a proposed modification which involves industry being provided with a clear increasing trajectory for the base tariff rates to 2020 so as to provide greater certainty as to the total DS3 revenues that will be paid out each year, while acknowledging that the application of scalars will still make up any shortfall in revenues with reference to the SEM Committee approved glidepath.
- Two respondents supported the TSOs' recommendation and basis for a conditional tariff review although they expressed concerns if there were to be any restrictions that are not technology neutral.
- One respondent agreed with the proposal but commented that the conditions need to be clearly defined and understood by the TSOs, RAs and service providers at the outset. The respondent commented that a process where investors have to wait till a defined annual tariff review point (with no corresponding guarantee) is not going to fix price uncertainty.
- One respondent considers that provision should be included in the enduring DS3 framework to adjust the base tariff rates for inflation. To the extent the TSOs' recommendation would only apply annual tariff reviews where predefined conditions have been meet and would not allow for indexation to be applied to the base tariff rates, the respondent does not support this proposal. However the respondent does support the TSOs' position that where high wind load factors in a given year result in high over-expenditure there should not necessarily a revision in the DS3 tariff rates.
- One respondent recommended an annual review be performed with a limit on the annual scalar and tariff deviation stating that this methodology would achieve the level of investment the RAs and TSOs desire for the successful implementation of DS3 and reduce the risk of over spending.
- One respondent stated that while recognising the responsibility to manage expenditure, this must be balanced with providing the required level of certainty to investors. The respondent disagreed with any measure which would materially negatively impact on revenues for parties which are already contracted and stated that once a party has signed a multi-year contract they should be able to rely on a base case revenue stream driven by the tariff on signing along with a reasonable certainty of scalar impacts on that tariff. Since new contracts will be

awarded on a regular basis the respondent believes that managing expenditure can be achieved more pragmatically by limiting contracts awarded and ensuring that projects are delivered in a timely manner.

- One respondent supports a review of the DS3 tariffs at the end of year 1 and again at the end of year 2 of I-SEM operation given (a) I-SEM is a significant change from how SEM operated, and (b) many assumptions have been made as to how the I-SEM market and participants in same will operate which may not all be accurate. Thereafter the respondent supports a move away from the mechanical annual tariff review, and supports a move to a "review as required" regime subject to (i) clear and agreed criteria and (ii) the tariff rates shall be guaranteed not to reduce (iii) there will be a mandatory tariff review every 3 years.
- One respondent believes the certainty required by investors is a minimum glide path and therefore an increase in tariffs annually. This lower rate would assume that all scalars have a minimum of one. The respondent does not have a preference as to whether annual or conditional increases are the way forward. The respondent commented that all reviews due to under-expenditure will always be welcome but investors cannot invest if a conditional review or annual review has the potential to reduce the base rates and/or result in dilution of previously expected revenues.
- One respondent agreed with the TSOs on the matter.
- One respondent stated that in principle they acknowledge the need to provide stability of the tariff structures but would, however, be concerned if tariffs could not rise in line with inflationary costs.
- One queried what the TSOs deem as a "significant under expenditure" in a tariff year and what this under expenditure is referenced from. It is solely from the glide path? The respondent stated that all tariffs should be index linked at a minimum, not fixed and determined solely by a conditional review.
- One respondent stated that an annual tariff review might protect the short term interests of the end consumer but adds significant risk to new build investors. Whether or not a conditional tariff review is acceptable to the respondent depends on how "bounded" it would be and the conditions under which it could be triggered. The proposed boundary conditions look reasonable to the respondent except that some over-expenditure in the early years should be accepted if it is due to the build of necessary new plant. This would provide confidence that there will be sufficient new DS3 plant by 2020 to help enable Ireland to meet its renewable electricity targets and not be penalised by the EU.
- One respondent did not agree with any conditional review of tariffs for contracts already signed. While they recognise the responsibility to manage expenditure, they stated that this must be balanced with providing the required level of certainty to investors. The respondent disagreed with any measure which would materially negatively impact on revenues for parties which are already contracted. The respondent expressed the view that once a party has signed a multi-year

contract they should be able to rely on a base case revenue stream driven by the tariff on signing along with a reasonable certainty of scalar impacts on that tariff.

Question 5: Are there other considerations on the conditions under which a conditional review would be triggered?

- One respondent suggested that the MW installed of non-synchronous generation should be considered as a condition for a tariff review considering it inversely affects the payment scalars and is outside the control of the TSO/DSO and any potential provider.
- A number of respondents sought a conditional review in the case of underinvestment. One respondent suggests his could be a reflection of lack of investment and product provision and this may limit the ability to operate above 60% SNSP. A second respondent favours a conditional review in the case of underinvestment, but not for over investment as they do not believe that the main approach of base rates plus scalars is conducive to a sound investment environment. The respondent also expressed the view they would favour a review of a scarcity scalar over the potential application of a volume scalar. They note, and welcome the minded to position in the DS3 System Services Enduring Scalar Design not to implement a specific Volume Scalar for Regulated Arrangements.
- Two respondents commented that they do not support the introduction of conditional tariff review mechanisms that discriminate against particular technology types. However, in the case where such mechanisms were introduced the respondents argue that the counter position should also be provided for. The respondent suggests that in the event that there is underinvestment in new demand side technologies, and consequently insufficient system flexibility and storage available to meet the stated DS3 objective, an equivalent conditional review of tariffs could facilitate adjustment to encourage market development.
- One respondent stated that applying a tariff review to mitigate potential over-expenditure places an additional risk on investment in service provision. The respondent suggests that there are mechanisms such as the grid connection policy that could be applied to ensure the growth in quantity of system services is achieved in a measured way. The respondent commented that while grid connection policy is outside of the TSOs' control the coordination of different aspects of the industry is important to support the realisation for the required investment in system services.
- One respondent commented that a possible consideration would be to have a conditional review of scarcity scalars if necessary, unless the volume scalar had already taken care of that.
- One respondent believes the considerations as outlined in the consultation appear sufficient but suggests that the criteria is amended to take a five year

rolling DS3 System Services payment review period into account. The respondent commented that such a regime would mean that an overspend in total in any one year would not prevent payments being made if there has not been an overspend over the previous five year review period. An additional benefit of this according to the respondent is that this will not force an unnecessary fundamental change in the DS3 payment regime.

- One respondent stated that the key condition should be demonstrable risk of unsatisfied system needs, as presented by the second condition proposed in the paper – a lack of investment in needed services demonstrated by significant under expenditure – assessed for each service..

Question 6: Have you any comments on the proposal to exclude a high annual wind capacity factor as a consideration for triggering a conditional tariff review?

Almost all respondents agreed with the TSOs' proposal to exclude a high annual wind capacity factor as a consideration for triggering a conditional tariff review. The following provides a summary of the comments received by those in favour of the proposal:

- In supporting the proposal to exclude a high annual wind capacity factor as a consideration for triggering a conditional tariff review, one respondent highlighted enabling high levels of renewable generation as the core principle of the DS3 programme while another respondent stated that opposing it would be counter intuitive to the overall DS3 project goals. Another respondent commented that should the annual cap be exceeded due to higher than anticipated levels of wind/solar generation, then this should be considered as a successful outcome and the annual cap should be increased accordingly demonstrating greater than budgeted progress toward achieving >75% SNSP and >40% of electricity generated from renewable sources. Another respondent stated that high annual wind capacity factor is an indicator of success.
- In agreeing with the TSOs' proposals, one respondent stated that a system with high annual wind capacity complements the DS3 market and would reduce energy prices accordingly. To penalise the providers who enabled the achievement of these SNSP levels seems to the respondent to be counter to the intent of DS3.
- One respondent stated that the TSOs' proposal is sensible in that wind blowing one year, and associated high levels of SNSP, does not infer that the same will happen the following year.
- Two respondents support the TSOs' proposal to exclude a high annual wind capacity factor as a consideration for triggering a conditional tariff review, as they consider that the stepped rather than linear scalar effectively mitigates the risk of over expenditure. The respondents stated that they also recognise that any over expenditure in a given year as a consequence of wind capacity factor's is more likely to be an anomaly specific to that year, rather than an ongoing risk since the forecast modelling is based on 10 year historical averages.

- One respondent agreed with the TSOs' proposal stating that service volumes should track service requirements and high wind imposes high system service requirements.
- One respondent supported the TSOs' position that where high wind load factors in a given year result in high over expenditure system services expenditure there should not necessarily be a revision in the DS3 tariff rates. Additionally, the respondent stated that the linear nature of the SEM Committee DS3 System Services expenditure glide path is unlikely to reflect the profile of increasing wind capacity on the system given the incentives put in place by the existing renewable support mechanism. As such where there is a rapid increase in the level of wind capacity connected, the respondent believes that the SEM Committee expenditure glide path should be revised upwards rather than the DS3 tariff rates being adjusted.
- One respondent believes that the TSOs' logic should be applied to the overall Enduring Tariff and Scalar design and not just as a trigger for a conditional tariff review. The respondent stated that the DS3 programme needs to be considered in conjunction with the energy markets.
- Two respondents strongly supported the TSOs' proposal and sought that the Scarcity Scalar should also remove any interaction with annual capacity factors for wind.
- One respondent commented that a high or indeed low annual wind capacity factor should not trigger a conditional tariff review.
- One respondent supported the proposal stating that there is not a strong correlation between a high annual wind capacity year repeating itself year on year.

Separately, there was one respondent that stated that they do not support the proposal of a review in any year of an over- or under-spend in total, but alternatively proposed a rolling five year DS3 payments regime whereby an overspend in any one year is allowed to be paid out if there has not been an overspend in aggregate over the last five years, and no conditional review will take place. The respondent commented that such a rolling payment regime is likely to provide greater certainty in relation to DS3 payments. Without such a rolling five year payment regime, the respondent believes the entire conditional review process is undermined and thus a return to the mandatory annual review would have to be reconsidered.

TSOs' Response (Questions 4, 5 and 6):

We acknowledge the concerns of respondents that the inclusion of conditional reviews creates uncertainty. In order to provide as much price certainty as possible while still ensuring appropriate expenditure controls are in place, the TSOs recommend that the tariff rates should be set once at the beginning of the regulated arrangements and only adjusted if specific conditions are met.

For the non-competitively awarded contracts, the TSOs consider it prudent that a conditional review of the tariff structure (and associated scarcity scalar structure) should be initiated during the term of the regulated arrangements under the following conditions:

- Subject to a tolerance, the TSOs would have the right to adjust tariffs and/or scarcity scalar values on a quarterly basis (i.e. every 3 months) if over-expenditure occurs for reasons other than high wind conditions subject to Regulatory Authority approvals. We would not envisage having to invoke this clause but the ability to do so is needed should circumstances arise that would challenge our ability to control expenditure;
- Subject to Regulatory Authority approvals, the TSOs would have the right to adjust tariffs and/or scarcity scalar values if there is significant under-expenditure in a particular tariff year as this may highlight a potential unbalanced tariff pricing or scarcity scalar structure.

In response to suggestion that the introduction of conditional tariff review mechanisms might discriminate against particular technology types, we assure stakeholders that our recommended conditional review process is technology neutral and will apply equally to all service providers with non-competitively awarded contracts i.e. regulated tariff contracts.

The TSOs consider that over-expenditure as a result of wind conditions in one year would likely be offset by under-expenditure in another year. The TSOs have also conducted analysis on the magnitude of any additional consumer benefit that might arise from increased wind energy due to a high wind capacity factor.

As can be seen from the analysis described in Appendix 3, there is an estimated €20.5 million additional consumer benefit associated with a high wind capacity year of 33% in 2020.

Therefore, to provide greater investment certainty, and in the context of the analysis presented in Section 4.3.2.2, the TSOs recommend that over-expenditure as a result of a high annual wind capacity factor should not be considered as cause to initiate a conditional review of the regulated tariff structure.

We recommend that the contracts awarded to high availability units through a competitive process should not be subject to the price uncertainty that comes with conditional reviews i.e. contracted parties would have full certainty of the price they would receive for provision of the five services for the full duration of their contract.

A1.5 Scarcity Scalar Framework

Two questions in the DS3 System Services Enduring Tariffs consultation paper related to the design and implementation of a scarcity scalar framework for the enduring tariffs. These questions were:

Question 7: ***Have you any comments on the TSOs' recommendation to use the 'Stepped' scarcity scalar design rather than the 'Linear' scarcity scalar design?***

Question 8: ***Should we decide to use a 'Stepped' scarcity scalar, are there other considerations which we should consider in its design?***

The responses to these questions are grouped into a number of key themes below.

A1.5.1 'Stepped' scalar versus 'Linear' scalar

The majority of responses received agreed on the TSOs' recommendation to use the 'Stepped' scarcity scalar design rather than the 'Linear' scarcity scalar design. The primary reasons highlighted by respondents for this agreement were:

- It will enable the TSO to forecast expenditure levels and have greater control as regards potential over expenditure versus the glide path.
- It provides a simpler mechanism for the administration and communication of this scalar.
- The 'Stepped' model aids the service provider in forecasting revenues by providing greater confidence in estimating the number of periods when the scarcity scalar will be a given value in the longer term. It was acknowledged that this is at the possible expense of missing increased payments when SNSP is high in the 'Linear' scalar design.
- The 'Stepped' scalar reduces sensitivity to wind capacity factors and improves forecasting of revenue compared to a linear approach, hence encouraging financing by new service providers.
- The 'Stepped' scalar is appropriate for the initial years of system services contracts due to uncertainties but should be reviewed periodically to see if a 'Linear' scalar is more appropriate in the long term.

Comparatively, there were a minority of respondents who favoured the 'Linear' scalar over the 'Stepped' scalar. The primary reasons given for this decision were:

- A suggestion was put forward by multiple respondents that the there may be merit in the 'Linear' scalar if the starting point is not 60%, but instead a SNSP value in the range 40 – 45%. This may provide an enhanced incentive for the provision of services at current high SNSP levels and it would provide investors some incentive to begin development now. SNSP levels in excess of 60% are not guaranteed due to the numerous uncertainties highlighted by the TSOs in the consultation paper. This may disincentive investors if the 'Stepped' scalar is chosen.
- The 'Stepped' scalar design presents developers with a cliff-edge risk whereby access to higher scalar values could be prevented by TSOs implementing SNSP limits just short of a scalar threshold value. While the TSOs have given no indication of such a policy, this is a risk which could be identified by investors who would discount project values accordingly and consequently prevent or delay investment in new service provider assets. A 'Linear' scarcity scalar may not be perceived by investors to be a perverse incentive to hold down SNSP limits in the same way that a 'Stepped' scalar could be perceived.

- A further suggestion was that a 'Linear' scalar of the Day Ahead Market position would provide more consumer benefits and higher investor certainty once the slope of the curve was considerably shallower.

TSOs' Response:

The TSOs are recommending the use of a 'stepped' scarcity scalar predominantly for the following reasons:

- Lower volatility: The modelling conducted by the TSOs, which was set out in the consultation paper show that there is lower volatility to overall payments with the use of a 'stepped' scalar design.
- Greater certainty for service providers: The 'stepped' scalar design aids service providers in forecasting revenues by providing greater confidence with regards to the number of periods when the scarcity scalar will be a given value.

A1.5.2 Re-design of 'Stepped' scalar

There were numerous suggestions for the re-design of the 'Stepped' scalar from the respondents. These related to both the SNSP value at which the scalar was implemented and the review period of the scalar.

The suggestions relating to the interactions between the 'Stepped' scalar and SNSP value can be summarised as follows:

- A number of respondents disagree with the proposal to implement any scalar that offers zero payment under the temporal scalar for SNSP levels less than 60%, especially FFR. Respondents state this further increases the risk to those who do invest in the provision of those services. Furthermore, scalars being at 0 from 0-60% adds another layer of unnecessary complexity as to when they should be available or not and therefore confusion in the marketplace.
- Respondents proposed that there should be a scaling up of the temporal scarcity scalar in order to reduce volatility for service providers, with numerous values proposed for the starting point of the increase in scarcity scalar. Various respondents proposed 50% and 55% SNSP, while one suggested the granularity scalar value steps increases for each 5% step change in SNSP. This would reflect the way in which the SNSP has been increased thus far, and is expected to increase as different parts of the DS3 project are delivered, and it would help to remain within the expenditure cap.
- Two respondents proposed FPFAPR and DRR are paid for above 60% SNSP, similar to FFR. They argue that to only pay for these services above 70% will not create the desired targeting of investment to provide these services. Furthermore, the respondents would strongly oppose the provision of FPFAPR and DRR to become Grid Code requirements as many generators currently connect to the system may not be capable of providing the fast response is required.

While the comments relating to the review period of the scarcity scalar can be summarised as:

- The ‘Stepped’ scalar is appropriate for the initial years of system services contracts but should be reviewed periodically to see if a ‘Linear’ scalar is more appropriate.
- A further respondent suggests that if the stepped scarcity scalar is used, they recommend that this is reassessed annually as part of the proposed conditional review to ensure expenditure is in line with the glide path, giving security to investors while also protecting the consumer.
- One respondent highlights that there is significant amounts of money associated with the scalars with no certainty they will be paid out. They suggest this revenue is rolled forward to the years ahead and is not lost from the DS3 workstream. The respondent suggests this operates on a 5 year rolling basis.
- Another respondent suggested that neither the ‘Stepped’ or ‘Linear’ scarcity scalars provide security to generators in the case of forecast error. The respondent commented that the scalars can only be set to the proposed TSO levels if there is an equivalent increase in certainty of the arrangements for over four years.

TSOs’ Response:

In relation to concerns raised over the relationship between the ‘Stepped’ scalar and the SNSP values proposed by the consultation respondents, the TSOs accept that the scarcity scalar design consulted on leads to an exposure to investments in low wind years especially where FFR represents a material revenue stream underpinning the investment. In that context, the TSOs consider that modification to the FFR scarcity scalar is warranted.

However, any such change proposed by the TSOs should be linked in the first instance to the technical merits of FFR and not solely for the need to cover downside investment risk.

To this end the “Facilitation of Renewables” studies and subsequent engineering work established that to move above 50% SNSP would require new sources and types of system services. This arises as conventional plant is increasingly displaced by non-synchronous generation in real time operation. This causes two fundamental challenges.

- Finding sources of existing system services that the displaced synchronous generation provided; and
- Finding new types of system services to cover the new system technical scarcities created by having fewer synchronous generators on.

The former services are generally covered in what was called the “Harmonised Ancillary Services” (HAS) arrangements. The latter services are either an increase in the system need for known services or the need for previously unconsidered system services.

These new system services are required to solve technical scarcities arising out of the system being lighter and less synchronous. There is a complex interaction between a range of technical phenomena including reduced inertia, synchronising torque and system wide electromagnetism. These combine to undermine the resilience of the power system that society has come to expect and the economy relies on.

FFR is one of these new services. As the system is lighter, when a disturbance occurs on the power system there is less time for plant to provide their reserve response. In addition, the system-wide Rate-of-Change-of-Frequency” (RoCoF) limit needs to be respected.

The “Facilitation of Renewables” study indicates that there is technical benefit in addressing these issues for operational dispatches at SNSP levels of 50% and above. The techno-economic analysis[24] also indicates that there is economic benefit for being able to have a system RoCoF capability of greater 0.5 Hz/s above 50% SNSP.

The TSOs acknowledge that the SEM Committee have asked that the counterfactual for the DS3 System Services valuation start from an SNSP level of 60% and a 1 Hz/s RoCoF standard. However, this is only for the purposes of sizing the value of DS3 System Services not its allocation.

To that end, the TSOs are proposing a scarcity scalar for FFR which has a value of 1 between 50% and 60% SNSP (i.e. payment at the FFR base tariff rate). This provides some additional revenue certainty in low wind years. However to keep the system services expenditure within the overall cap, the TSOs are recommending adjusting the scarcity scalar values for all services at SNSP levels above 60%

A1.5.3 Re-allocation of scalar revenue to increase base tariffs

A number of the respondents believed that the scarcity scalar values were set too high in the consultation document. The argued that a greater value would be provided to customers if the scalars were decreased and the money allocated to them re-distributed to increase the base tariffs. A summary of the primary reasons put forward for this are:

- Redirecting some of the money towards increased tariffs provides greater certainty to service providers.
- There is no benefit in the ‘Stepped’ scalar over higher tariffs in terms of consumer benefit. This would be achieved through reduced System Marginal Price, lower Dispatch Balancing Costs and reduced Rollover payments.

TSOs’ Response:

[24] 2013 Value study

The TSOs acknowledge the concerns which have been raised by respondents in relation to the scalar values being set too high and how this may result in a barrier to potential additional customer value. In response to this, the TSOs have recommended increasing the base tariffs for all 11 existing System Services and the 3 new services, to be introduced in September 2018, by 5%. The scale of the increase is in the context of the SEM Committee's clear guidance to the TSOs that increases in expenditure should be targeted at new investment and/or at times of scarcity rather than paying out additional monies to service providers for their existing system services capability.

Cognisant of the SEM Committee guidance, we are in turn recommending that the scarcity scalar values published in the consultation, which were 6.2 from 60% - 70% SNSP and 8.2 above 70% SNSP, be reduced to 4.7 for SNSP levels between 60% and 70%, and to 6.3 for SNSP levels above 70%. This re-distributation of System Services revenue should increase the value to consumers by providing a greater revenue certainty for service providers to invest in services below 60% SNSP. It also reduces risk to investors in FFR by increasing the base revenue stream from 50% SNSP onwards.

The impact of these changes, combined with the FFR scarcity scalar changes, on expected overall expenditure is set out in the Section 4 for a range of scenarios.

A1.5.4 SNSP Value Transparency

A number of respondents highlighted the need to be transparent with the SNSP calculation method and value used for the scalar application. Many respondents called on the mechanism for the SNSP value to be clarified. The primary concerns raised were:

- It was not clear from the consultation document what value of SNSP would be applied in any settlement period. One response stated that the start of period value, end of period value, maximum, minimum or mean value could be applied to settlement period values. It was also suggested that the instantaneous value could be applied on a second by second basis but this would introduce significantly complexity.
- One recommendation put forward was that the maximum SNSP value within each settlement period should be applied to the whole settlement period.
- The introduction of the scarcity scalar adds further complexity to the settlement which is already strained. The importantance of a rigorous reporting and testing of SNSP levels being available to participants was highlighted.
- It may be possible that the real time provision of an SNSP value may be different to the SNSP value retrieved after all metering is collected and analysed. This raised the concern that the TSO decision may be made on different data than the provider will be paid against. It was highlighted that this potential issue should be addressed and that providers are not penalised in any way due to any data mismatch.
- The method of SNSP value calculation is especially important at SNSP levels close to the scarcity scalar tipping point (e.g. 60% in the proposed 'Stepped'

scarcity scalar). The TSO should be cogniscant of the interactions between the SNSP level and scarcity scalar may have implications for service providers who also participate in the energy market and may impact on the bidding regimes of these providers.

- There should be no incentive for the TSO to keep levels of SNSP down to stay below the expenditure cap.
- Consideration should be given to how best to communicate the expected and actual variances in SNSP, interconnector flows and variable renewable generation to ensure all stakeholders are aware of the relevant scalar changes.
- A number of respondents raised alternatives to using SNSP as the trigger for the scarcity scalar. An example of such a suggestion was to calculate payments using an annual base case spend. Annual payments would then be made on this basis ex-ante with a factor applied for the times when the SNSP was above 60% and the unit was available.

TSOs' Response:

The TSOs acknowledge respondents concerns' on the ability to be able to predict the actual or "operational" SNSP for a given trading period and that this might present issues with regard to how they would bid into the day-ahead, intra-day and balancing markets in the new I-SEM arrangements.

The TSOs acknowledge and agree with respondents that the day-ahead, intra-day and balancing markets in the I-SEM will require an estimation of SNSP to formulate appropriate bidding strategies. In addition the use of scarcity scalars does lead to increased volatility in the short term particularly when the SNSP is operating near scarcity scalar thresholds (e.g. 60% SNSP).

However the TSOs are recommending that there be no change to the use of the operational SNSP metric. This is for the following reasons:

- The TSOs are recommending the use of a stepped rather than linear scarcity scalar. This design mitigates any uncertainty in the price paid for a service when the SNSP exceeds a given threshold. Therefore, in the hour-ahead timeframe, the only periods when there might be uncertainty in the short term DS3 System Service revenues are those periods where SNSP transitions from above to below or below to above 60% SNSP and 70% SNSP. The frequency of these transition periods is limited.
- The DS3 System Services arrangements are designed to drive improved behaviours in existing providing units as well as facilitate appropriate investments in new performance capability to efficiently meet public policy objectives. These are long term signals for the operational capability of the power system to manage high renewables. The use of the operational SNSP is the best metric to represent this. More specifically the use of ex-ante market-derived SNSP metrics allow for the possibility of a divergence between this estimate and what actually occurs in operations. Were this to arise the DS3 System Services revenue would

be going to units that would not be contributing to overall system resilience at the time. While this is not a significant issue if there is little divergence, if material, it would undermine the efficacy of the whole DS3 System Service arrangements. Given the level of re-dispatch away from market outcomes in today's SEM market the TSOs consider that it would not be appropriate to consider using an ex-ante market assessment of SNSP for settlement at this time. Were the I-SEM arrangements to show that ex-ante market schedules were close to real time operational needs and that DS3 System Services revenues were being appropriately bid into the various markets this could be looked at again.

A1.6 Over-expenditure Risk due to High Availability Technologies

There were two questions (Q9 and Q10) in the DS3 System Services Enduring Tariffs consultation paper related to the TSOs' proposals for mitigating over-expenditure as a result of potential overinvestment by high availability technologies.

The stakeholder responses to each of these questions are provided separately below. We then provide a single overall response to the stakeholder responses following the summary of the stakeholder responses to Q10.

Question 9: Do you agree with the TSOs' recommendation on the method by which to mitigate over-expenditure as a result of potential overinvestment by high availability technologies?

The majority of respondents agreed with the TSOs' view of the need to mitigate over-expenditure as a result of over investment by high availability technologies. However, there were a number of comments regarding the method by which this could be best achieved.

These included:

- implementing a gated structure for projects that are advanced in their development stages and have planning in place. This could be implemented on an annual basis whereby there would be a cap on the allowed level of new DS3 service providers added a first come first served basis.
- should a mitigation measure prove necessary it should only apply to new entrants to the market after the implementation of the measure and should not have an impact on services providers that had already invested in services provision (noted by 2 respondents).
- implementing the Volume Scalar, which was not recommended for implementation in the Enduring Scalar consultation (suggested by 2 respondents) and reduce of the portion of the budget applied to the scarcity scalar (1 respondent).
- implement a volume limit (cap)

- further consultation on this topic is required (3 respondents)
- consider the implementation of a product scalar.

Of the respondents which disagreed with the proposals, the following were the reasons given for this stance:

- One respondent stated that a review of the enduring tariffs would discourage investment and that limiting the volume of services rewarded during trading periods would result in additional uncertainty for investment and should be avoided. They noted that in this scenario investors would not have certainty that they would be paid for all services provided and felt that this option contradicted the benefit of scalars to encourage availability during periods of high SNSP.
- One respondent commented that the suggested methods undermine historical assertions that DS3 System Services are technology neutral and questioned how the high availability of required services can be framed as a weakness of a technology class. They also noted that the faster products require new technologies that focus primarily on the delivery of DS3 System Services, that these projects will, by their nature, have high-availability and must not be disincentivised if the ambitions of the DS3 Programme are to be met.
- Another respondent stated that there should be no potential for restriction on service providers' availability that is discriminatory against a particular technology type. They commented that it could also be perceived that the TSO is favouring thermal generation which has little flexibility and no inherent energy storage capability over new technologies like DSU and batteries which are the most suited to supporting the increase in renewable generation and SNSP.
- The respondent believed that a more sensible and reasonable technology agnostic approach would be to allow a conditional review (similar to that recommended on tariff rates) of the procurement volume on a holistic basis or at a service level where volumes provided are in excess of 2020 forecast requirements at any time during regulated arrangements and are causing an over expenditure vs the glide path. They commented that while such a mechanism would diminish investment certainty which is undesirable, it would at least do so in a manner that is technology neutral and that if a competitive procurement process is required at an individual service basis or on a holistic basis as a consequence due to over expenditure, all service providers should be on a level playing field and tender accordingly.

The following is a summary of other comments received in relation to Question 9:

- One respondent commented that there was too great an emphasis on cost control, resulting in the balance of risk being against the investor.
- One respondent questioned whether the TSOs are conflicted in their decision making given their the ownership of the EWIC interconnector, and decisions

related to flows on this asset can have a material impact on SNSP levels, imports/export volumes, and DS3 payments, given it is normally the largest import/export source in the system. They stated that it is imperative that the right operational decisions to be made at all times for the safety, stability, security and integrity of the system. The respondent requested the RAs and TSOs to provide comfort to industry that steps have been taken, and procedures are in place, to ensure operationally the TSOs will at all times make decisions in the best interests of the system as a whole, and that there is a robust, stringent monitoring and reporting regime in place to ensure this is always the case.

- The respondent outlined a related concern around the fact that the TSO will seek RA approval in order to make investments in EWIC. They stated that in the case being made to support this investment application the TSO will have to outline forecast volumes, and like many investment decisions it is likely a prudent view will be taken concerning volumes. They commented that if approval is given for investment, and the resulting volumes exceed those forecast in the business case (which it is assumed will also be used in setting tariffs and budgets), an over-expenditure may result primarily due to these prudent forecast volumes. The respondent asked the TSOs and RAs to advise how they would guard against such a situation, and/or how they would prevent adverse negative impacts on the market if such a situation were to arise.

Question 10: Have you any comments on a preferred method to implement a procurement based volume limit on the level of high availability technologies to obtain system service contracts?

- Three respondents stated that the glide-path volume limit for new DSUs and Non-Synchronous Technology option was the most preferable of those proposed by the TSOs.
- One respondent stated that it was the most transparent and fairest way to apply a volume limit. They noted however, that in some cases it may delay a service provider entering on to the framework and for this reason any “minimum duration/term” should only begin from a provider entering the framework and not from the outset of the framework itself.
- Another of the respondents stated that this would provide the greatest visibility of annual expenditure and inform potential investors of the system needs. They commented that more information is required on how the first come first served basis would be administered, to provide certainly that new providers would be operational when required.
- One respondent noted that it would be beneficial if the TSOs could set out at what level of installed capacity of high availability technologies they would consider that a volume limit would be likely to become necessary. The respondent considers that there is potential for other mechanisms, such as grid connection policy, to be applied to ensure that the growth in quantity of system services is achieved in a measured way. They commented that if the volume at

which the incremental value to the TSOs of high availability service providers becomes questionable was known, the planned 'DS3 gate' planned under the CER's interim connection policy could be tailored to a level at or below this point.

- Two respondents stated that further work and further consultation on this matter is required before an informed decision can be made.
- One respondent suggested that an auction should be held to procure the required volume.
- Two respondents held the view that following the introduction of new technologies to DS3 System Services, there should be no potential for restriction on a service provider's availability in order to encourage investment in DSU and storage technologies. As for the proposals outlined to militate against over expenditure, the respondents viewed such a restriction as clearly discriminatory against a particular technology type and not in support of the technology neutral values in the TSOs' mandate.
- Of the options presented, one of the respondents favoured a 2020 volume cap on the basis that this or any chosen option should remain technology neutral.
- One respondent commented that DSUs currently have only one revenue stream which itself is likely to decrease significantly in December's first capacity auction. They stated that the revenue that DSUs can potentially earn in the future from DS3 is extremely uncertain with many unanswered questions about market entry outstanding at this point meaning clear direction is impossible to give to end consumers who provide DSUs' capacity. They noted that further uncertainty will exacerbate this problem at a time when the survival of a viable DSU industry in the Irish market is seriously under threat.
- The respondent supports an ultimate competitive procurement process for the procurement of DS3 services to ensure that the consumer is protected from over expenditure and argued that it is essential that there is some certainty in revenue streams for a minimum of 4 years.

TSOs' Response (Questions 9 and 10):

We note that a number of respondents felt that further consultation was necessary in relation to our proposals on the best method by which to mitigate over-expenditure as a result of potential over-investment by high-availability technologies and/or the implementation of a volume limit on the contracts awarded to high-availability technologies. With reference to this, more details on the proposed procurement-based mitigation measure are provided in the DS3 System Services Consultation on Contracts which is currently out for consultation.

A variety of views were received from respondents in relation to the most appropriate options. All of these options were examined by the TSOs, who, in arriving at a final recommendation aimed to find a solution which, while being technology neutral to the furthest extent possible, will ensure that DS3 System Services expenditure levels were well-managed, in the interests of the end consumer.

With regard to the concerns raised about EWIC and possible conflicts of interests for the TSOs, the Regulatory Authorities consulted extensively around the potential for conflicts of interest related to the allocation of roles in the I-SEM and DS3. They have decided to add in four additional layers of governance and transparency to provide assurance to market participants and the Regulatory Authorities. These are:

- The addition of a licence obligation to appoint a compliance and assurance officer who will undertake an annual audit of SONI and EirGrid's compliance with a number of licence conditions, including the duty not to discriminate.
- The introduction of an obligation on the TSOs to produce a Balancing Market Principles Statement to introduce transparency around the scheduling and dispatch decisions. This has been consulted upon extensively and any future iterations will also be subject to consultation.
- Increased reporting of data associated with the scheduling and dispatch process under the new arrangements also.
- An annual audit of the scheduling and dispatch process to ensure compliance with all statutory obligations.

A1.7 Market versus Physical Dispatch Position

There were two questions (Q11 and Q12) in the DS3 System Services Enduring Tariffs consultation paper related to the TSOs' proposal to delay the implementation of taking the higher of a service provider's market position or physical dispatch, to determine the available volume of a service, for a minimum of 12 months post I-SEM go-live.

The stakeholder responses to each of these two questions are provided separately below. We then provide a single overall response to the stakeholder responses following the summary of the stakeholder responses to Q12.

Question 11: Do you agree with the TSOs' recommendation to delay the implementation of taking the higher of a service provider's market position or physical dispatch, to determine the available volume of a service, for a minimum of 12 months post I-SEM go-live?

The majority of respondents to the consultation did not agree with the TSOs' proposal to delay the implementation of taking the higher of a service provider's market position or physical dispatch to determine the available volume of a service for a minimum of 12 months post I-SEM go-live and instead expressed the view that the SEMC decision should be implemented on Day 1 of I-SEM. Reasons given by respondents for disagreeing with the TSOs' recommendation included the following:

- One respondent held the view that that the proposal to delay the SEMC decision that DS3 payments should be made on the basis of the higher of a unit's market position and physical dispatch by 12 months would further hamper confidence in revenue certainty. This view was shared by other respondents who also

commented on the proposal to reserve €15m of the total DS3 budget to cover the additional expenditure that could arise as a result of the SEM Committee decision to pay based on the higher volumes arising from a unit's market position or physical dispatch position. The respondents stated that the seemingly arbitrary proposed delay and deduction undermine potential forecasts of DS3 revenues by participants as other such delays or deductions may occur unexpectedly in the future.

- Another respondent commented that as the nature of the I-SEM market is a move away from the SEM central dispatch model and closer to self-dispatch, that part of the efficient operation of I-SEM will rely on the consistency of the incentives faced by market participants. They stated that if the goal of minimising TSO actions in advance of the balancing market timeframe is to be achieved, it is important the service providers see a clear incentive to position themselves through their day-ahead and intra-day trading to provide the required levels of system services and on that basis do not support a delay in the implementation of the SEMC decision. They did, however, welcome the clarification that under I-SEM the SEMC decision will be given effect be applying a unit's Final Physical Notification (FPN) as the market position.
- Another respondent described the TSOs' recommendation to delay the implementation of the SEMC decision for 12 months as is a critical decision that reduces the impact of TSO actions on plants' (not behind TSO constraints) DS3 revenue. The respondent believes that this decision should have been implemented at the time DS3 started and that a delay is further inequitable treatment of plants that are not favoured by TSO constraints. The respondent went on to comment that there is a risk of over-expenditure on all system services yet it is only the payments due to market position or physical dispatch decision that are proposed to be delayed. They stated that if there is an overspend at the end of the first year that it is not the equitable decision of taking the higher of a service provider's market position or physical dispatch that is the reason, but rather the tariffs and scalars need to be addressed. The respondent sought assurances from the RAs and SEMC that the decision of taking the higher of a service provider's market position or physical dispatch will be implemented as per the SEMC's decision. They suggested that Market Participants should be encouraged to submit invoices for the DS3 Revenue that they would have received if the higher of Market or Physical was taken and that the TSO guarantee that all interest due to participants for the withholding of these revenues will be paid.
- A further respondent commented that implementation of the SEMC decision must not be delayed as it will add even more uncertainty to this DS3 revenue stream. They stated that DS3 providers need to be able to factor in their revenue streams to their energy bids to ensure that they are profitable and competitive. They commented that if the decision is not implemented that it will cause market distortions as providers try to mitigate risks associated with different dispatch instructions away from their FPNs. Another respondent stated that more

information must be supplied regarding this delay and the impact this will have on the projected revenues for investors as it creates further uncertainty for investors before go-live.

- Another respondent commented that prompt access to all due revenue associated with an investment is an important factor in investment decisions and that delaying access to this particular revenue might prevent investment in new service provider assets. They stated that when a battery energy storage service provider is recharging, it is able to deliver a greater volume of services than indicated by the MEC. The volume which is technically realisable would be the sum of the import volume (in a similar manner to the volume of a DSU which can be dispatched to zero MW) plus the MEC. If the TSOs wish to access this additional volume capability by redispatching the unit from its market position (normally zero or nearly zero MW) to an importing physical dispatch (subject to available unused charging capacity) then procurement contracts should reflect this capability and the unit should be rewarded for the cost of resultant additional battery degradation by implementing the higher volume resulting from the service provider's market position or physical dispatch.

Of those respondents who agreed with the TSOs' recommendation, the following were the views expressed:

- One respondent commented that they agreed with the approach, but that a materiality threshold should be applied to ensure that the resettlement exercise does not impose a substantial administrative burden on service providers.
- A further respondent welcomed the proposal to ensure that any TSO dispatch within the energy market does not impact the DS3 revenue to a generator. They noted that Generators shall position their units in I-SEM in line with their commercial strategy, and dispatches away from that position could impact projected revenue. They commented that, at the same time, the dispatch by the TSOs of units, with zero I-SEM energy position, that provide additional benefit to the system should receive the full DS3 revenue and that it is understandable that the decision on whether to implement this shall be delayed for at least 12 months, in order to assess the interaction of such approach. They commented that it is unclear at present how energy bidders shall be impacted by the DS3 provision during periods of high SNSP, and it would be best to see how the I-SEM Market settles prior to making a connection between it and DS3 settlement.

Question 12: Do you have any comments on the method by which a resettlement between market and physical dispatch could occur following the 12 month delay?

As noted in the summary of respondents' comments for Question 11, the majority of respondents to the consultation did not agree with the TSOs' proposal to delay the implementation of taking the higher of a service provider's market position or physical dispatch to determine the available volume of a service for a minimum of 12 months post

I-SEM go-live. Therefore, there were not many suggestions from respondents relating to the method by which a resettlement should occur if it is implemented. Comments centred more on the timelines for implementation of resettlement. The following comments were received in relation to the resettlement process:

- One respondent commented that the details of [the] mechanism interacting between both markets is not clear at present and that because of this it is difficult for participants to put strategies in place to compensate for any resettlement. The respondent did not support resettlement for this 12 month period due to the high risk associated with it.
- Another respondent commented that they cannot understand that resettlement could be expected to occur as late as 12 months after [go-live]. They did not see a reason as to why resettlement could not occur after 2 months. This view was shared by two further respondents, who questioned why resettlement cannot be monthly or bimonthly.
- Another respondent stated that although they do not agree with the delay of the implementation of the higher of the market and physical dispatch, that if the RAs agree with implementing a resettlement following a 12-month delay there must be no doubt of full reconciliation. They commented that the proposed 12-month delay places a financial burden on the cashflow of effected companies and suggested that a quarterly resettlement would be a reasonable delay period. In addition, they stated that market participants should be encouraged to submit invoices with suitable backup to Eirgrid for the difference between their market and physical dispatch.
- One respondent commented that there are already significant concerns, given experiences to date, in relation to how well settlement will occur in the I-SEM market given the material increase in complexity between I-SEM and SEM and stated that these concerns are only multiplied if there is the potential for resettlement, so they reiterated their opposition to any delay in the implementation of the SEMC decision.
- Another respondent commented that the settlement and resettlement is already difficult to manage for participants, with the introduction of new scalars and now with this potential resettlement it will become very difficult to reconcile. They stated that the settlement needs to be carefully considered and all systems ready and tested before any payments are issued under the new contracts such that the need for resettlement is minimised.
- One respondent commented that resettlement should not trigger a retrospective budget review due to breach of the allowed cap.

TSOs' Response (Questions 11 and 12):

We acknowledge that the majority of respondents to the consultation did not agree with our proposal to delay the implementation of taking the higher of a service provider's

market position or physical dispatch, to determine the available volume of a service, for a minimum of 12 months post I-SEM go-live.

We understand the concerns of market participants in this regard and we have therefore committed to working with the Regulatory Authorities to develop the payment rules ahead of I-SEM go-live. It is intended that market participants will know the final payment rules ahead of I-SEM go-live and will therefore be in a position to reflect on the impact of these rules when formulating their energy bids.

Once the ruleset is finalised, we recommend that it be applied from 1 June 2018[25]. From this date onwards, we will seek to track and collate all of the relevant information needed to implement the ruleset. We will then conduct a re-settlement exercise (accounting for the impact of the market position) that will cover the period back to 1 June 2018 when the settlement system changes have been implemented.

In response to respondents' comments that the proposed delay in implementation seems arbitrary in nature, the TSOs would like to explain that the impetus for the proposed delay comes from the practicalities of implementing such a fundamental change in the TSOs' settlement systems. Following finalisation of the ruleset ahead of I-SEM go-live, there will be a significant period of time required to deliver the IT Project necessary to facilitate settlement under the new ruleset. The exact timeline for completion of the IT project will not be known until the scope is finalised.

While this resettlement exercise is not expected to occur before June 2019, we will endeavour to complete the IT Project and to conduct resettlement as quickly as possible. In that context, the plan for resettlement will be communicated to stakeholders when the ruleset is finalised ahead of I-SEM go-live.

[25] The date chosen is 1 June 2018 as opposed to 23 May 2018 as such a major change to settlement is not possible to deliver mid-month (settlement is conducted on a calendar month basis).

Appendix 2: System Services Required

A2.1 Overview of System 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 were procured under these Harmonised Ancillary Services (HAS) arrangements.

New services are required to support a move to higher levels of non-synchronous generation. Four new services were introduced from 1 October 2016 following the commencement of the new DS3 System Services arrangements and a further 3 services will be introduced in 2018 (Fast Frequency Response, Dynamic Reactive Response, and Fast Post Fault Active Power Recovery). These will be required to maintain the resilience of the power system at SNSP levels of up to 75% by 2020.

The Grid Codes do not oblige generators, or other service providers, to deliver the new services. 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 4 provides a high-level summary of the DS3 System Services products.

Service Name	Abbreviation	Unit of Payment	Short Description
Synchronous Inertial Response	SIR	MWs^2h	(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 MVAr capability is achievable)
Dynamic Reactive Response	DRR	MWh	MVAr capability during large (>30%) voltage dips

Table 4: Summary of DS3 System Services Products

Appendix 3: Additional Consumer Benefit for High Wind Scenario

A high wind year can be considered as a year in which the annual wind capacity factor exceeds by a significant margin the TSOs' base case capacity factor assumption of 31%. In the TSOs' modelling, a wind profile with a 33% capacity factor is assumed for the High Wind scenario analysis i.e. a 2% increase in capacity factor relative to the base case.

If a high wind year were to occur, it could reasonably be expected that a reduction in energy prices would be observed to offset the expected increase in DS3 System Services expenditure. However, determining the exact additional consumer benefit arising as a result of a high wind year occurring is complex.

In 2013, the TSOs conducted a suite of studies to assess the benefits of introducing new system services arrangements. In the base case 2020 study year there was 4.6 GW of installed wind which generated 12.7 TWh of energy or (32.7% of the total island demand). This scenario had a production cost saving of €241 million with an accepted €177 million of consumer benefit (€58 million for the existing ancillary services was added to get the €235 million cap).

For a higher installed wind case (5.7 GW) it was found that wind produced 39.7% of the total energy with a production cost saving of €399 million against the base counterfactual. However the consumer benefit was identified at the time as difficult to measure and the results determined were unreliable.

Therefore, for this analysis, the TSOs propose to use the production cost savings, which we believe to be mathematically stable, (€241 million to €399 million) in moving from medium to high wind levels (32.7% to 39.7% of all-island demand) as the benchmark for estimating consumer benefit.

In that context, we have estimated the consumer benefits for the higher installed wind case by applying the ratio between production cost savings and consumer benefits observed for the base case (€177 million / 241 million = 0.73) to the production cost savings observed for the higher installed wind case (€399 million). This gives estimated consumer benefits of €293 million (€399 million * 0.73).

For the 2020 case, we can estimate the wind energy produced for a high WCF scenario (33% WCF) to be 13.1 TWh. This number is calculated by adjusting the 12.7 TWh wind energy produced in the original 31.8% WCF base case scenario to account for the higher 33% WCF. The 13.1 TWh of wind energy would account for 33.9% of the total island demand.

Finally, we can use all of this information to extrapolate the consumer benefit observed in the base case to provide an estimate of the consumer benefit associated with the higher 33% WCF as follows:

((€293m - €177m) / (39.7% - 32.7%)) * (33.9% - 32.7%) = €20.5 million

As can be seen, there is an estimated €20.5 million additional consumer benefit associated with a high WCF year of 33% in 2020[26].

[26] With a high capacity factor, annual wind energy would be expected to increase from 12.7 TWh to 13.1 TWh. Wind energy as a percentage of annual demand would increase from 32.7% to 33.9%. Extrapolating for the consumer value which assumed €177m in 2020 for a 32.7% wind penetration, an equivalent consumer benefit of €293 million for 39.7% wind penetration, it is estimated that there is €20.5 million benefit (i.e. ((293-177)/(39.7-32.7))*(33.9-32.7)=€20.5 million.

Appendix 4: Additional Modelling Results

Figure 8 illustrates the volumes for the 2019/20 Enhanced Capability scenario and the 2019/20 New Providers scenario following further assessment of the results and application of quality assurance measures. Note that the volumes presented in Figure 8 are following the application of the product scalars but prior to application of the scarcity scalars.

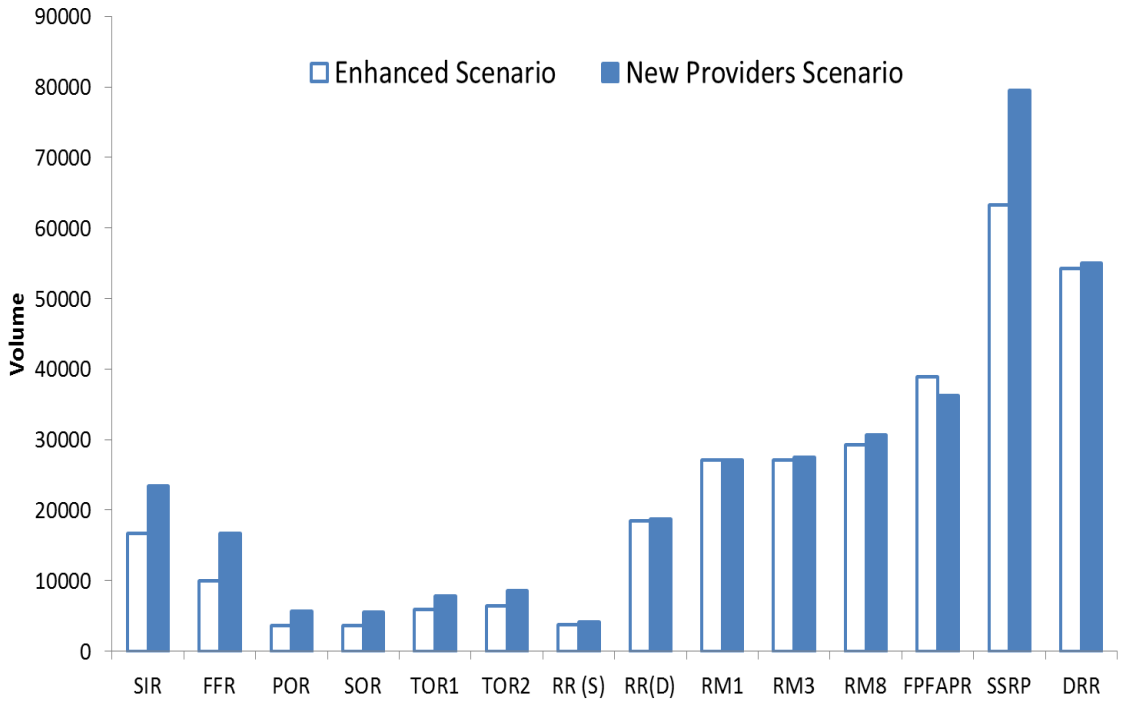

Figure 8: 2019/20 volumes for the Enhanced and New Providers scenarios

The expenditure per service, shown in Figure 9, illustrates the expenditure distribution across the services for both the Enhanced Capability and New Providers scenarios for the 2019/20 tariff year.

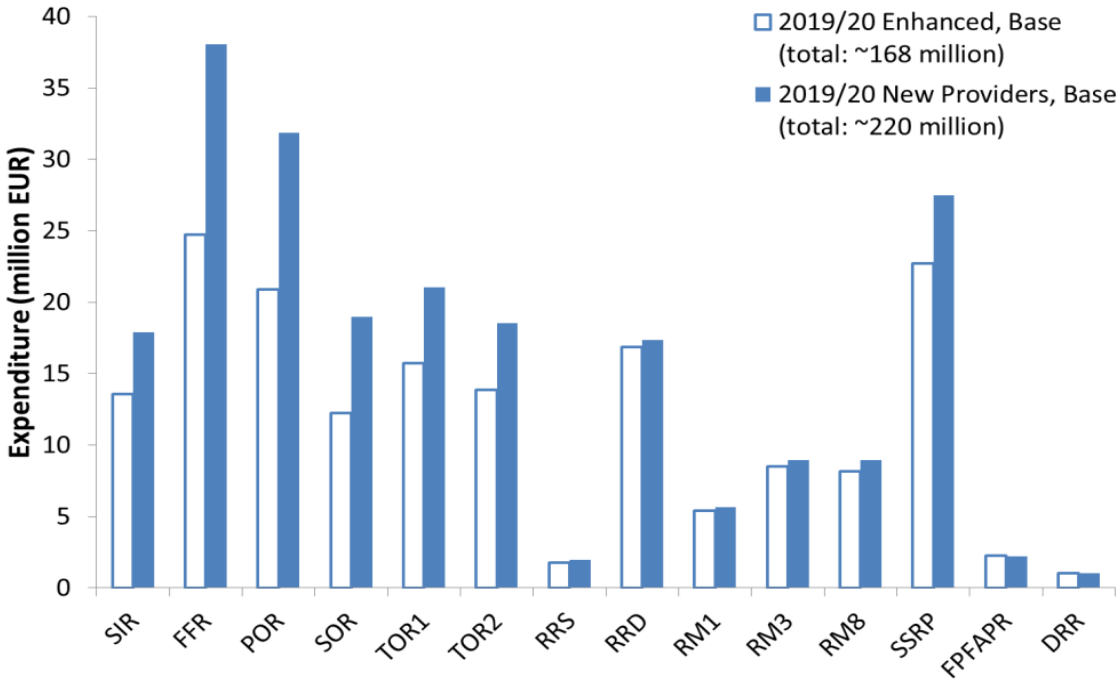

Figure 9: Expenditure per service for the 2019/20 Enhanced Capability and New Providers scenarios

The normalised annual revenues per technology type for the Enhanced and New Providers base cases in 2019/20 are shown in Figure 10.

The revenues shown are annual and represent Thousands of Euro per MW of Installed Capacity. These are average values calculated using the entire installed capacity of the portfolio and do not indicate what each individual unit would necessarily earn. Two CCGTs, for example, would earn very different revenues from DS3 System Services depending on the amount of run hours each one experiences in a given year.

Figure 11 shows the total annual revenue per technology type for the Enhanced and New Providers base cases in 2019/20.

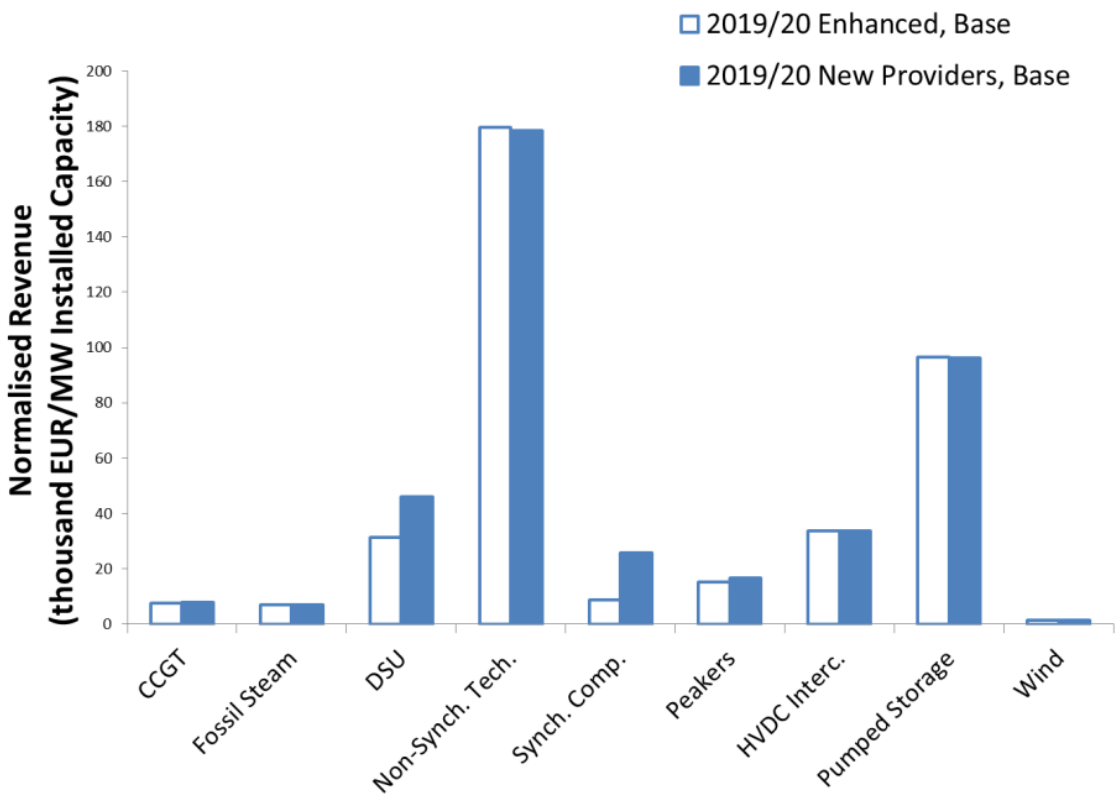

Figure 10: Normalised annual revenue per technology type for the 2019/20 Enhanced and New Providers base cases

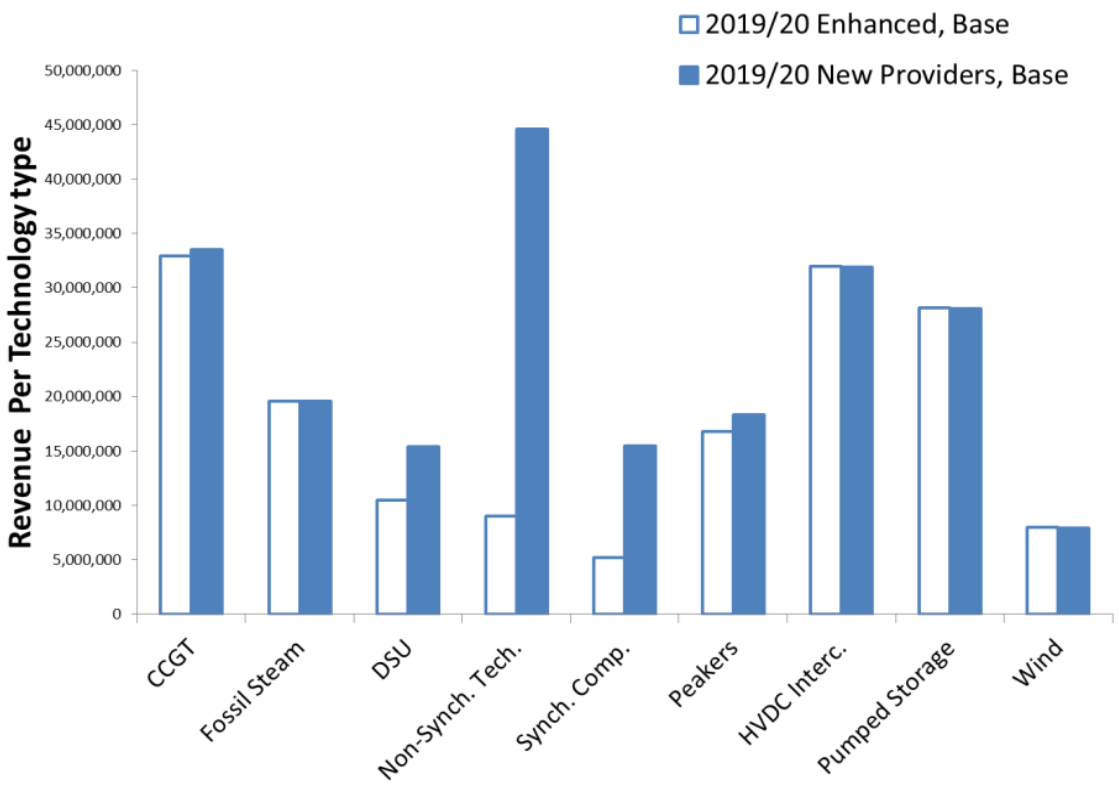

Figure 11: Total annual revenue per technology type for the 2019/20 Enhanced and New Providers base cases