DS3 System Services Tariffs

Consultation Document

28 March 2024

EirGrid SONI

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2. Executive Summary

The DS3 System Service arrangements came into being, on an interim basis in 2016, and on a fully regulated basis in 2018. At the time, the decision was made not to place a cap on the volume for which payments would be made and to apply a Temporary Scarcity Scalar (TSS) of 4.7 at times where System Non-Synchronous Penetration (SNSP) > 60%, increasing to 6.3 at times of SNSP > 70%. This approach was deemed prudent in order to reach our 2020 renewable goals by incentivising renewable and battery technologies on to the grid. As is laid out in Section 5, this has been very successful, with impressive growth in batteries, renewables, and DSU's and a power system that operates at 75% SNSP.

The SEM Committee has noted that it expects the TSO's to continually review the appropriateness of the DS3 System Service tariff rates and scalars. With scalars that benefited participants as we actively aimed to move towards times of ever increasing SNSP the model was always going to move towards a state of increasing payments to participants. With that in mind, section 4 of the contract put in place provisions to change the values of the TSS where required to manage DS3 expenditure. The existing arrangements were due to be terminated in April 2024, but were subsequently extended with the approval of the RAs currently to April 2026. The extension of the arrangements, in conjunction with a unique set of market conditions where interconnector imports remained high even at times of medium to high wind generation, has resulted in a notable increase in DS3 payments in 2023.

The mechanisms and scalar values as designed for a 2018 power system, have achieved what they were intended to do. Utilising the measures put in place to adjust the level of payments and to ensure the best value for the consumer, whilst ensuring system security, EirGrid and SONI feel it is an appropriate time to reassess the existing scalars in the context of current power system needs, availability of service provision, and expenditure on system services.

The DS3 System Services arrangements were designed to facilitate new and existing technologies and participants to provide services required to maintain a resilient power system when up to 75% of demand is met by non-synchronous technologies. It was an essential and critical pillar of the DS3 programme.

The SEM Committee consulted on the Phased Implementation Roadmap (PIR) for System Services Future Arrangements, during 2023, and on the 8th December 2023 published its decision[1]. As part of its decision the SEM Committee instructed EirGrid and SONI, in their respective capacities as Transmission System Operators (TSOs), to initiate a System Services Tariff review and consultation in Q1 2024.

Within this consultation paper, the TSOs provide a breakdown of the contracted volume growth in system services for each procured product. The analysis shows a significant increase in the fast acting reserve services from short duration batteries, DSUs and renewable technologies.

Given the contractual arrangements in place for DS3 System Services, there are limited options available to reduce DS3 expenditure. The TSOs are proposing the following options as part of this consultation: It should be noted that more than one option can be taken.

- Option 1: Reduction in the Temporal Scarcity Scaler (TSS),
- Option 2: Reduction in tariffs for Reserve Services,
- Option 3: Cease procurement of certain system services from next procurement gate.

Further information on the proposed options can be found in section 7.

The TSOs are also asking for information from stakeholders to assist us in determining if we should increase the reactive power (SSRP) tariff to encourage more volumes of SSRP system services from low carbon providers.

1 System Services Future Arrangements – Phase III: Detailed Design & Implementation – Phased Implementation Roadmap

Feedback on the questions and any other general comments are welcome. It is the intention of the TSOs to publish all responses and hence please mark your response as confidential if you do not wish your response to be published. All responses with be shared with Regulating Authorities. The consultation deadline is 26 April 2024.

The TSOs intend to hold a workshop and will advise industry stakeholders of the details in due course.

3. Outline of Consultation Paper

This consultation paper contains:

- Background and overall contracted volumes - This explains the history of system services and gives total contracted volumes for all system services at the close of Gate 9,
- Volume analysis – a breakdown of volumes per unit type to enable comparison against current requirements,
- Expenditure Analysis – breakdown of expenditure across technology types and impact of the Temporal Scarcity Scalar (TSS),
- Proposed options to manage future expenditure,
- Consultation questions,
- Appendices that provide more detail on Interconnector flows and Expenditure.

3.1.1. Scope of Consultation

This consultation applies to the DS3 System Services Regulated (Volume Uncapped) Arrangements. For the avoidance of doubt, the DS3 System Services Fixed Contracts (Volume Capped) Arrangements are not in scope for this consultation.

4. Background and System Services Volumes

4.1.1. Regulatory Framework

In its SEM-17-80[2] decision paper, the SEM Committee approved an expenditure cap for DS3 System Services of €235m/annum by 2020, to be achieved by following an annual "glide path". The decision noted that this represents an allowance and does not guarantee that these monies will be spent. In the same decision it was noted that the expenditure cap for DS3 System Services Expenditure will remain at €235m/annum post 2020 until decided otherwise by the SEMC following public consultation.

In May 2021 a Tariff consultation was led by the TSOs at the request of the RAs. Following a recommendations paper submitted to the RAs in August 2021, the SEM Committee made the decision to reduce tariffs by 10% for FFR, POR, SOR, TOR1 and TOR2 from January 2022[3]. A further TSO led system Services Tariff review consultation was carried out in September 2022. As a result the SEM Committee decided on 26th January 2023 to maintain the existing Tariffs[4].

The SEM Committee consulted on the Phased Implementation Roadmap (PIR) for System Services Future Arrangements during 2023 and on the 8th December 2023, published its decision[5]. As part of its decision the SEM Committee instructed the TSOs to initiate a System Services Tariff review and consultation in Q1 2024.

The current System Services procurement tariff mechanism is based on price regulation, whereby service providers are tested to prove their service provision capability and are subsequently paid based on their real time availability to provide a given service in each trading period. In that regard, there is currently no competition for individual services or TSO specified volumes required and the remuneration volumes per trading period are based on real time availability volumes. While this tariff based approach has been successful in providing a transparent and stable framework signalling future system requirements necessary for the renewable transition to 2020 and has successfully delivered SNSP operational levels of 75%, the extension of the current arrangements to 30 April 2024 (and subsequently to April 2026 per PIR decision), has led to significant investment in certain services (in particular by fast acting technologies).

[2] SEM-17-080 DS3 SS SEMC Decision Paper Regulated Arrangements Tariffs and Scalars Final version.pdf (semcommittee.com)
[3] SEM-21-089 Correspondence - SEMC to TSO - System Services Tariff Rate Review.pdf (semcommittee.com)
[4] System Services Tariffs Rate Review Decision Letter | The Single Electricity Market Committee (semcommittee.com)
[5] System Services Future Arrangements – Phase III: Detailed Design & Implementation – Phased Implementation Roadmap

4.1.2. Total Volumes Contracted

Table 1 below shows the system services procured to date by technology type following Gate 9 for which contracts became effective on 01 Oct 2023.

Service	FFR	POR	SOR	TOR1	TOR2	RRS	RRD	SSRP	SIR	RM1	RM3	RM8
Unit	MW	MW	MW	MW	MW	MW	MW	MVAR	MWS2	MW	MW	MW
Conventional	375	767	1157	1363	1985	4390	2083	6339	794856	6592	7872	8459
DSU	176	206	220	284	284	0	394	0	0	661	101	83
AGU	0	0	16	61	74	10	88	0	0	88	88	88
Wind	135	268	283	279	0	0	70	1568	0	0	0	0
Interconnectors	200	200	200	200	200	0	0	350	0	0	0	0
Battery	698	708	708	708	687	0	190	502	0	139	57	36
Hybrid	2	2	2	2	2	0	0	0	0	0	0	0
Solar	3	3	3	2	0	0	0	0	0	0	0	0
Total	**1588**	**2154**	**2589**	**2898**	**3233**	**4400**	**2825**	**8759**	**794856**	**7480**	**8119**	**8666**

Table 11 :Contracted Volumes of System Services Procured to Gate 9

As part of the monthly expenditure monitoring process in which the TSOs provide expenditure and volume reports to the RAs, the TSOs provide a breakdown of DS3 expenditure by technology type and provide volumes upon which payments have been made.

For certain services, there is no system requirement value available at a trading period level. Rather there are a number of constraints that drive the need for these services e.g. minimum number of generation units required to be running in a jurisdiction, specific units that need to be on for reactive power in areas of the island based on system demand scenarios etc. The latest Operational Constraints can be found on the SEMO website[6]. This is updated regularly.

For determining volume requirements for ramping services on a trading interval basis, an enduring ramping tool has been developed as a control centre decision support tool.

For the Steady State Reactive Power (SSRP) and Synchronous Inertial Response (SIR) services, these are linked to voltage and inertia constraints respectively as referred to in the Operational Constraints documentation referenced above (e.g. minimum number of synchronised units). For Replacement Reserves, while a minimum amount per jurisdiction is set out in the Operational Constraints documentation, they are modelled as maximum MW output constraints on certain units where this constraint level may or may not change with different availabilities of those units depending on the operational situation, and therefore this service does not strictly have a quantified required volume.

[6] TSO Responsibilities (sem-o.com)

5. Volume Analysis

In this section, the TSOs outline the changes in contracted volumes of system service providers for all the products that are procured. The following should be noted:

- The data is contracted volumes at the relevant procurement Gate. Availability on the day can change due to planned and unplanned outages,
- The unit type Conventional also includes Synchronous Compensators. This is done for confidentially reasons as there are not enough Synchronous Compensators on the power system to report this separately yet,
- Turlough Hill pumped storage is included in Conventional,
- Real-time volume requirements accounted for in the TSOs' scheduling and dispatch processes are as published in the weekly operational constraints document. Where there is no specific requirement published that the market system will schedule against, an estimate is provided; to give the reader an indication of contracted volume versus real-time requirements.

5.1.1. FFR Volume Analysis

In contrast to other reserves such as POR-TOR2, there is currently no operational policy with respect to FFR and, as such, no published requirement. Currently FFR provision from service providers is modelled in our systems which runs every few minutes. FFR has been a key enabler in reaching 75% SNSP. Note that as part of Future Arrangements for System Services (FASS) Product Review the TSOs are currently running studies to inform the FFR requirements and will be consulting with industry later in 2024. Under the Scheduling & Dispatch Programme, FFR requirements will be scheduled in the future. Different providers can respond in different timescales and hence it is complex to derive a single MW requirement and schedule for it. However, as an estimate of current FFR volume requirements is that they are similar in magnitude to other reserve services, i.e. in the 200-500 MW range. Operational reality is that as the TSOs schedule for Reserve, this requirement is automatically met at all times. Figure 11 below shows the cumulative changes in contracted volumes since 2021 at each System Service Gate.

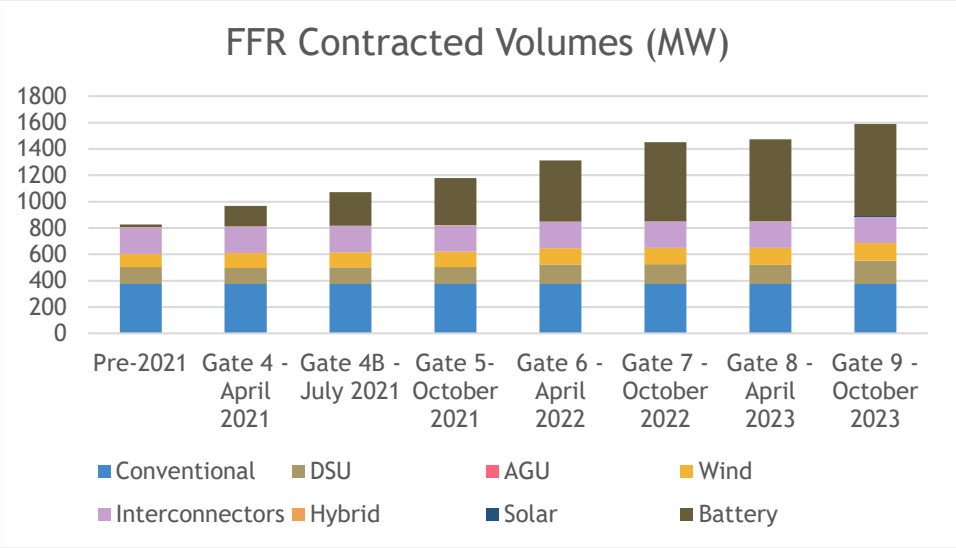


Figure 11 FFR contracted volumes by Unit type (cumulative change by Gate)

It can be observed that across the years, there has been considerable growth in volumes of System Service providers:

- Conventional generation has remained relatively unchanged,
- Wind and Solar contracted volumes have increased by ~34%,
- DSU contracted volumes have increased by ~38%,
- Battery contracted volumes have increased significantly from very low levels to around 700MW by Gate 9 and is the dominant growth driver.

5.1.2. POR Volume Analysis

The published requirement[7] is to cover 75% of the Largest Single Infeed (LSI) for all trading periods. Operationally the LSI ranges from ~211MW to 504MW dependent on the plant that is running at the time and its output level. Typically across the peak of the day, plant will be running higher to supply the demand and overnight plant will move closer to its minimum generation level. Interconnectors can also set the LSI with their schedules driven by market outcomes. Therefore this requirement will vary across the day. Figure 22 below shows the cumulative changes in contracted volumes since 2021 at each System Service Gate.

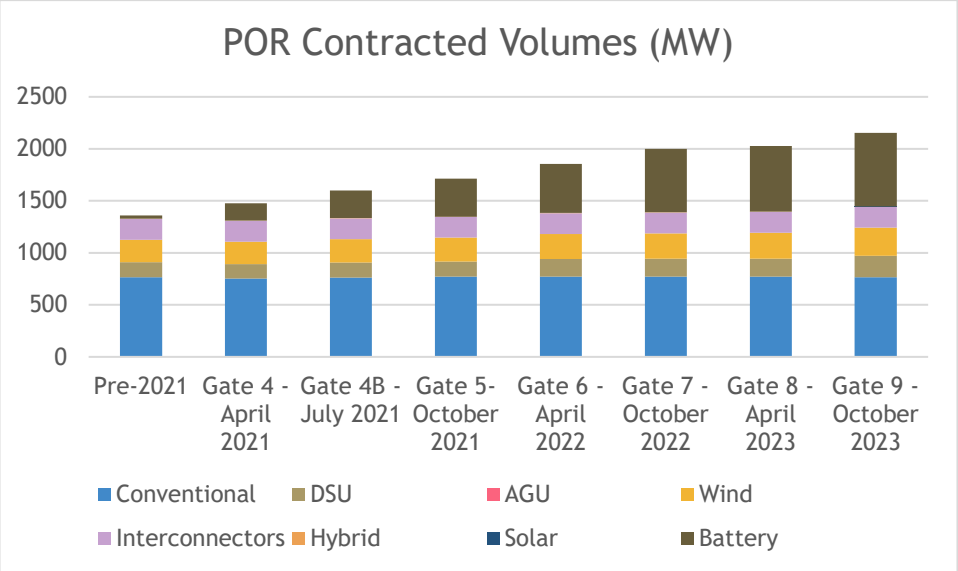


Figure 22: POR contracted volumes by Unit type (cumulative change by Gate)

It can be observed that across the years, there has been considerable growth in contracted volumes of System Service providers:

- Conventional generation has remained relatively unchanged,
- Wind and Solar contracted volumes have increased by ~25%,
- DSU contracted volumes have increased by ~41%,
- Battery contracted volumes have increased significantly from very low levels to over 700MW by Gate 9 and is the dominant growth driver.

[7] TSO Responsibilities (sem-o.com)

5.1.3. SOR Volume Analysis

The published requirement[8] is to cover 75% of the Largest Single Infeed (LSI) for all trading periods. Operationally the LSI ranges from ~211MW to 504MW dependent on the plant that is running at the time and its output level. Typically, across the peak of the day, plant will be running higher to supply the demand and overnight plant will move closer to its minimum generation level. Interconnectors can also set the LSI with their schedules driven by market outcomes. Therefore this requirement will vary across the day. Figure 33 below shows the cumulative changes in contracted volumes since 2021 at each System Service Gate.

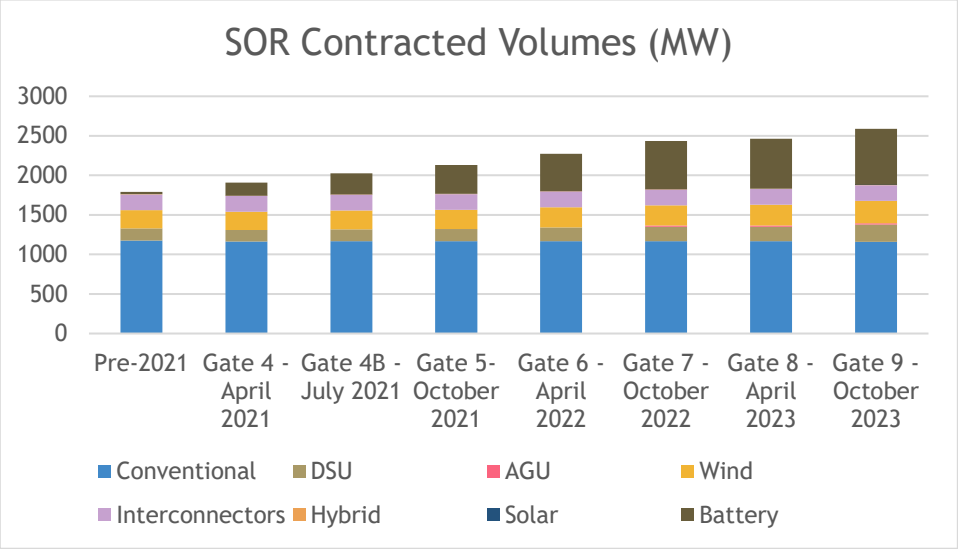


Figure 33 - SOR contracted volumes by Unit type (cumulative change by Gate)

It can be observed that across the years, there has been considerable growth in contracted volumes of System Service providers:

- Conventional generation has remained relatively unchanged,
- Wind and Solar contracted volumes have increased by ~23%,
- DSU contracted volumes have increased by ~43%,
- Battery contracted volumes have increased significantly from very low levels to over 700MW by Gate 9 and is the dominant growth driver.

[8] TSO Responsibilities (sem-o.com)

5.1.4. TOR1 & TOR2 Volume Analysis

The published requirement[9] is to cover 100% of the Largest Single Infeed (LSI) for all trading periods. Operationally the LSI ranges from ~211MW to 504MW dependent on the plant that is running at the time and its output level. Interconnectors can also set the LSI with their schedules driven by market outcomes. Like other reserve products the requirement will vary across the day. Figure 44 below shows the cumulative changes in contracted volumes since 2021 at each System Service Gate.

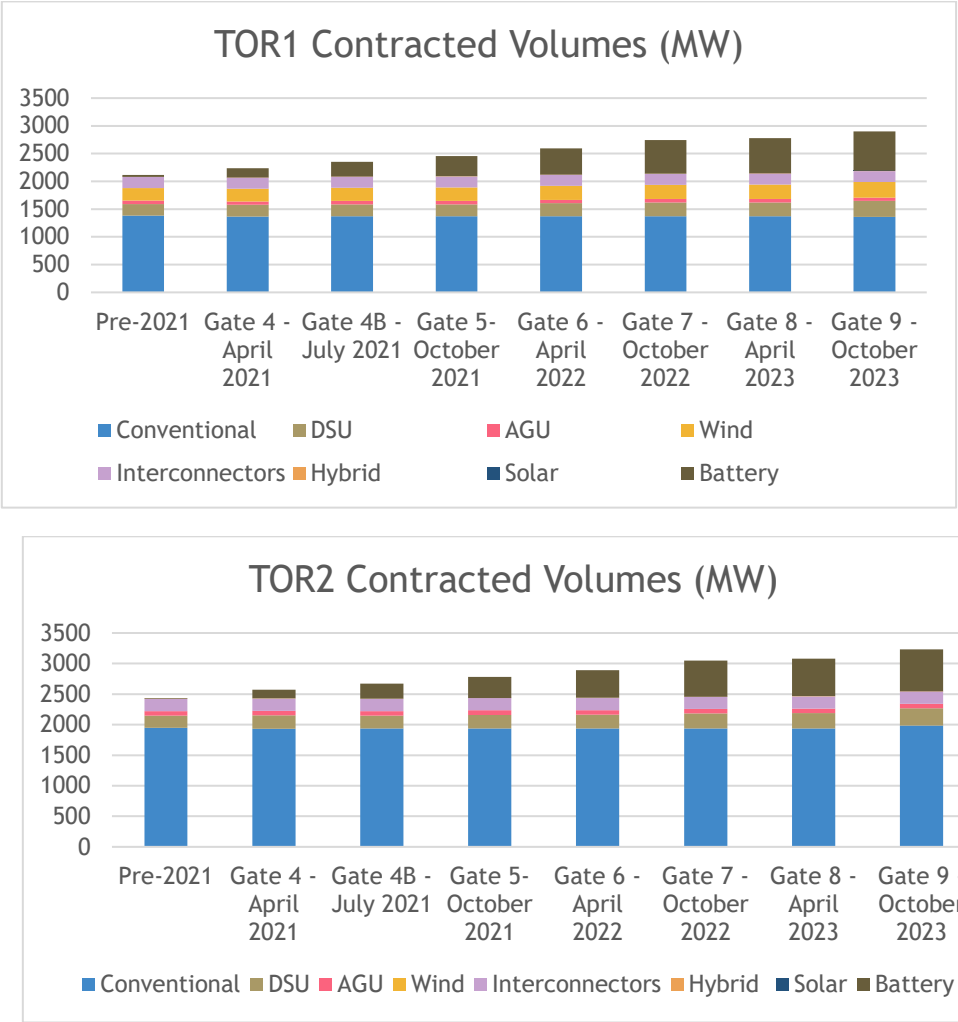


Figure 44 - TOR1&2 contracted volumes by Unit type (cumulative change by Gate)

It can be observed that across the years, there has been considerable growth in contracted volumes of System Service providers:

- Conventional generation has remained relatively unchanged,
- Wind and Solar contracted volumes have increased by ~22% for TOR1 (no TOR2 contracted volumes),
- DSU contracted volumes have increased by ~37% for TOR1 and 43% for TOR2,
- Battery contracted volumes has increased significantly from very low levels to around 700MW by Gate 9 and is the dominant driver (TOR2 volumes are slightly lower than TOR1).

[9] TSO Responsibilities (sem-o.com)

5.1.5. RR Volume Analysis

Specific Replacement Reserve requirements are published in the weekly operational constraints update[10]. Figure 5 below shows the cumulative changes in contracted volumes since 2021 at each System Service Gate.

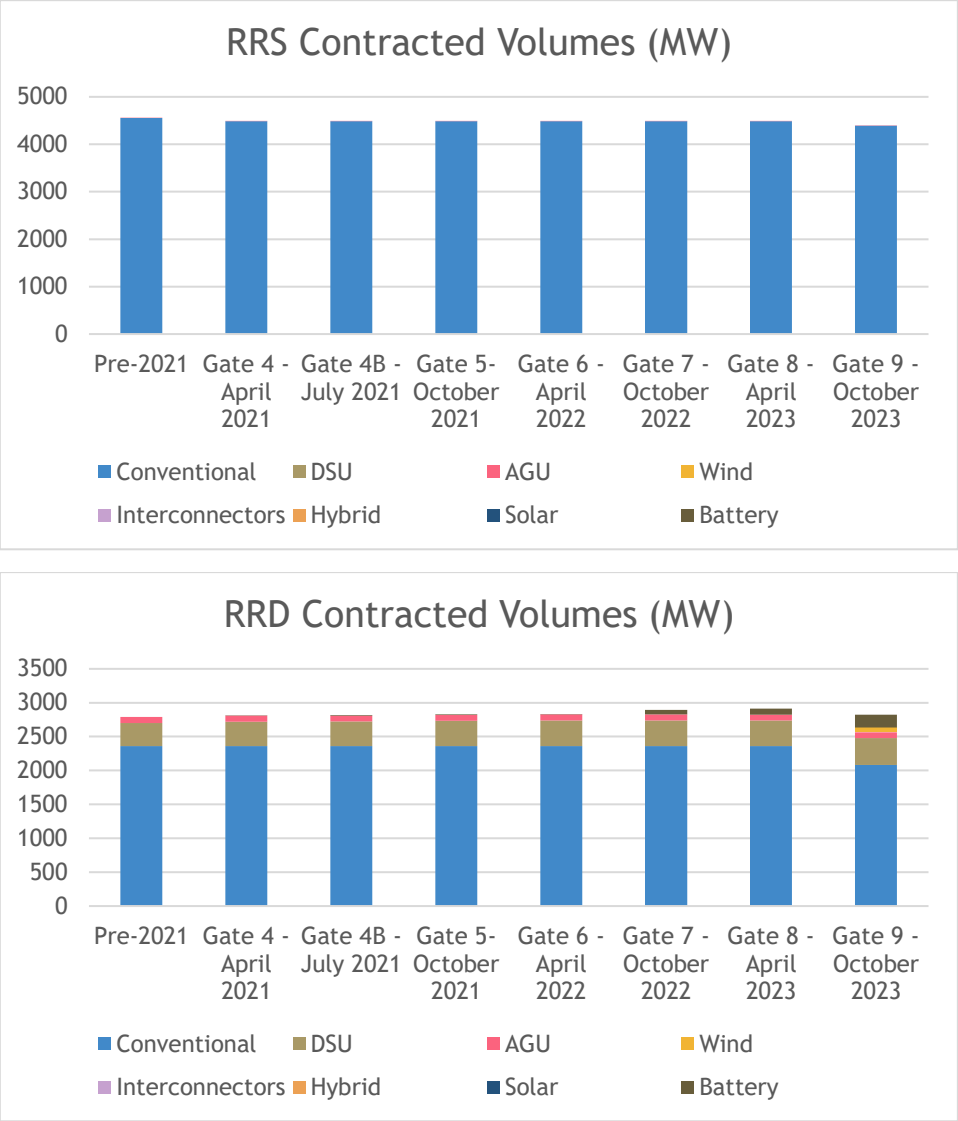


Figure 55 - RR contracted volumes by Unit type (cumulative change by Gate)

It can be observed that across the years, there has been relatively little change in contracted volumes compared to other reserve products such as FFR, POR and SOR. As units close and new units commission, this contracted volume will fluctuate in future Gates.

[10] TSO Responsibilities (sem-o.com)

5.1.6. SSRP Volume Analysis

Reactive power is required to maintain the security of the power system and the requirement can be very localised in regions dependent on system conditions. Hence it is not appropriate to provide a single number. The TSOs manage via voltage constraints where units may be constrained on but there is also a general requirement for voltage support at every node in the Transmission system. The voltage constraints are as published in the weekly operational constraints update[11]. Figure 66 below shows the cumulative changes in contracted volumes since 2021 at each System Service Gate.

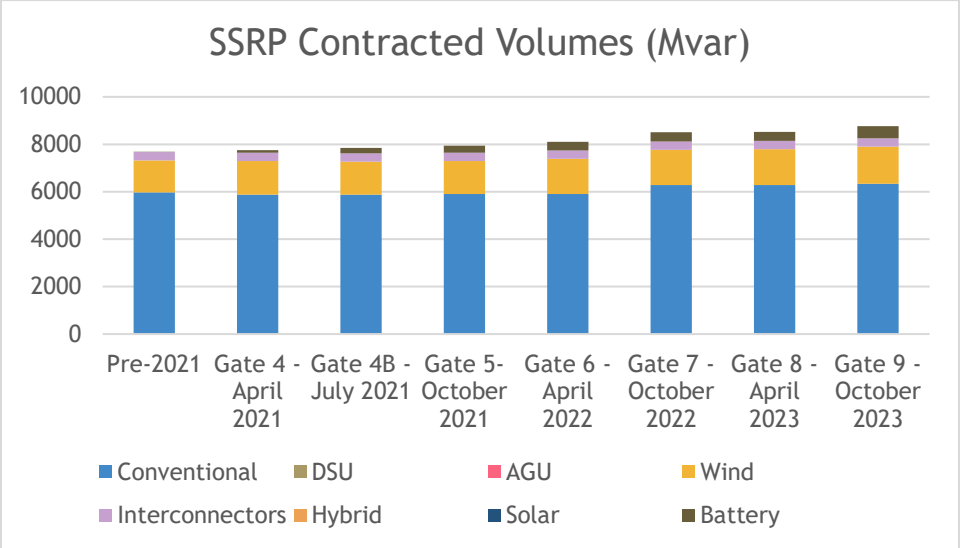


Figure 66 – SSRP contracted volumes by Unit type (cumulative change by Gate)

It can be observed that across the years, there has been modest growth in contracted volumes of System Service providers:

- Conventional generation, including synchronous compensation, contracted volumes have increased by ~6% and is the main source of reactive power provision,
- Wind contracted volumes have increased by ~23%,
- Battery has increased from very low levels to over 500 Mvar by Gate 9 and is the dominant growth driver.

[11] TSO Responsibilities (sem-o.com)

5.1.7. SIR Volume Analysis

The inertia requirement is currently 23,000MWs as published by the TSOs in the weekly operational constraints[12]. Figure 7 below shows the cumulative changes in contracted volumes since 2021 at each System Service Gate. Please note the unit for SIR is MWs^2 and while related, they are different. Therefore it is not appropriate to compare a MWs inertia requirement with a MWs^2 SIR level. However, the data is presented to show relative changes in SIR contracted volumes. SIR as a product was designed to incentive provision of synchronous inertia at low MW output levels.

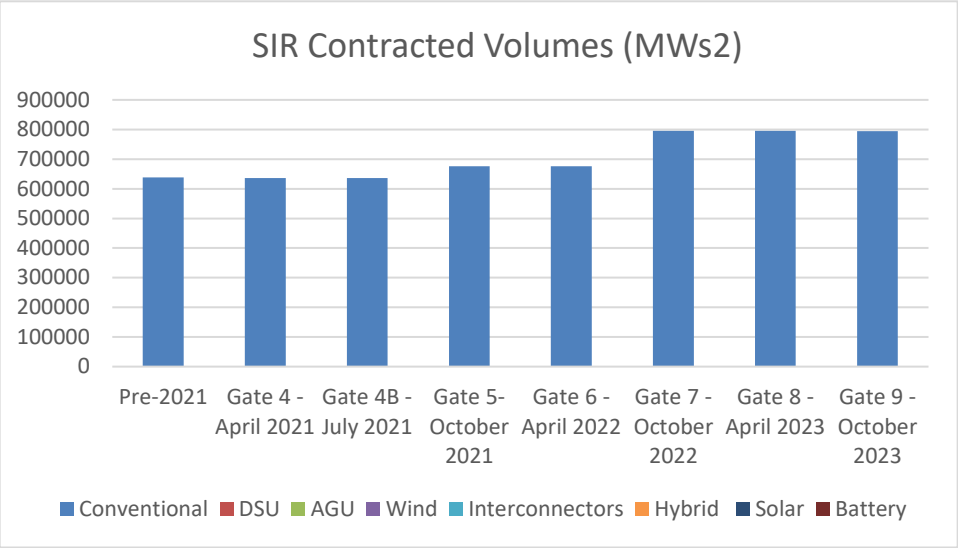


Figure 77- SIR contracted volumes by Unit type (cumulative change by Gate)

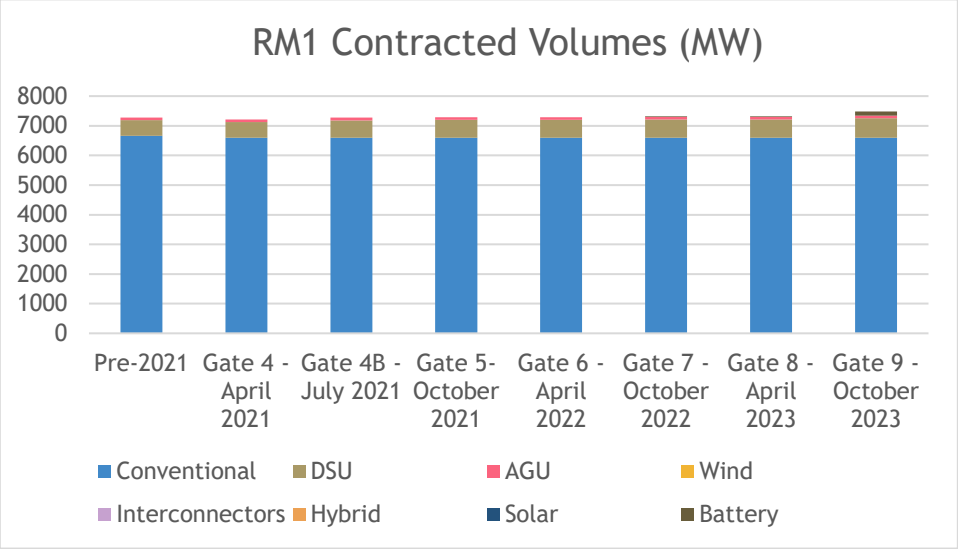
The only providers of this system service are Conventional unit types, which includes Synchronous Compensators (providers of inertia which do not generate MW). For this analysis all sources are included together for confidentially reason as the number of individual Synchronous Compensators is small. This will change in the future due to on-going procurement.

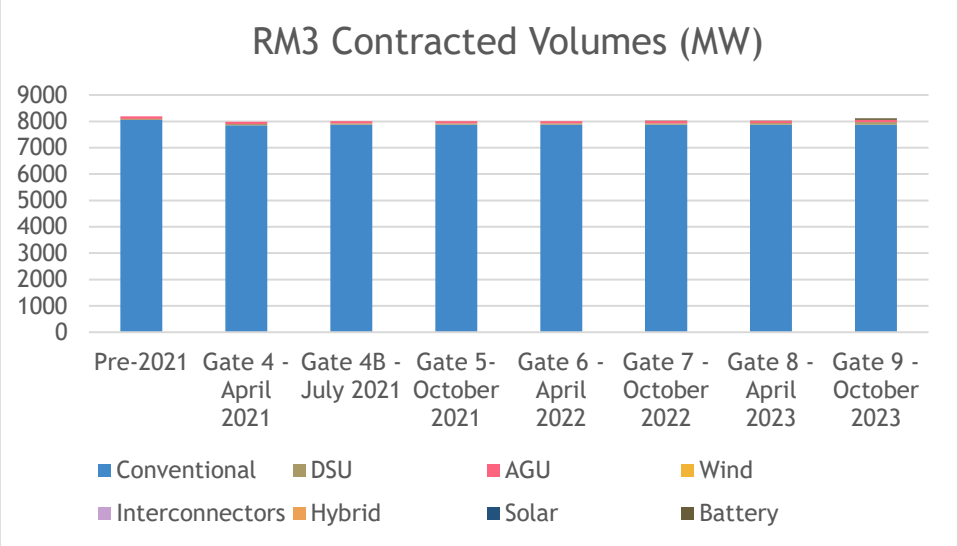
While there is sufficient inertia capability to meet requirements, the vast majority is provided by conventional, carbon fuelled, generation. The TSOs are currently procuring Low Carbon Inertia Service (LCIS) to maximise renewable output and are separately trialling a reduction in the number of conventional sets required to be running on the island from 8 to 7 with the intention to further reduce this constraint in the period to 2030.

[12] TSO Responsibilities (sem-o.com)

5.1.8. RM Volume Analysis

Ramping requirements are variable dependent on time, rate of change of demand changes and other renewable changes. Of growing dominance is the variable nature of wind where it does not outturn as forecast. TSOs have observed actual wind being 50% lower than forecast in a particular period. Therefore this requirement can vary from relatively low requirements (low renewable periods) to >3000+MW requirement in high/stormy wind conditions. Figure 88 below shows the cumulative changes in contracted volumes since 2021 at each System Service Gate.





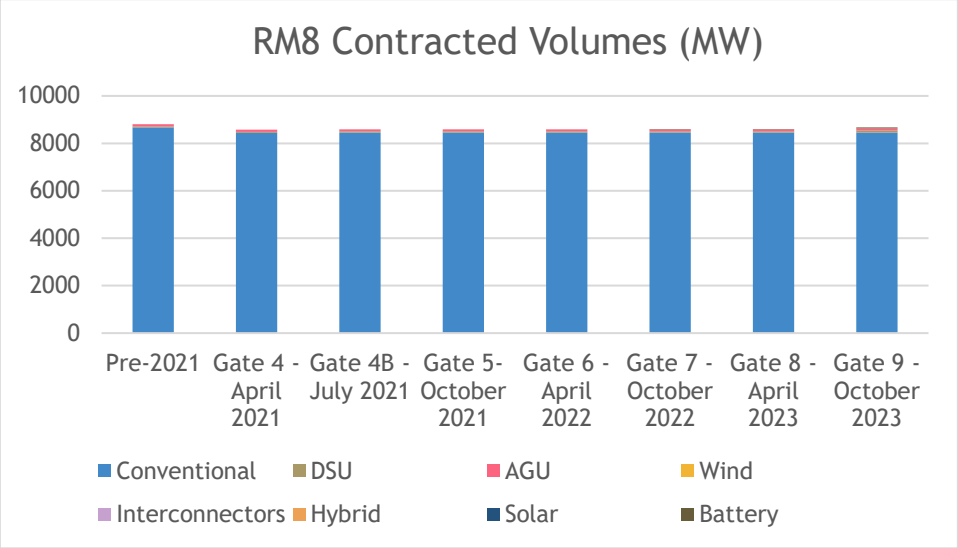


Figure 88 - RM contracted volumes by Unit type (cumulative change by Gate)

It can be observed that across the years, there has been modest growth in contracted volumes of System Service providers:

- Conventional generation contracted volumes have remained relatively unchanged,
- DSU contracted volumes have increased by ~26% for RM1, ~123% in RM3 and ~94% in RM8,
- Battery contracted volumes are currently relatively low but in Gate 9, we have observed a material increase. For future gates we expect this to grow as longer duration battery storage connects.

5.1.9. Summary of Volume Analysis

The analysis shows that while some contracted services have been relatively stable with modest changes, there has been a significant growth in the fast acting reserve services (FFR, POR, SOR, TOR). The main drivers for this growth are batteries, DSUs and renewable technologies. The result is a current oversupply in these system services such that the number of frequency deviations below 49.7Hz on the power system has declined. It should be noted that the Largest single Infeed (LSI) on the island will increase with the commissioning of the Celtic interconnector. This will result in higher requirements for fast acting services.

At present the TSOs observe high availability of system service providers for the fast acting services irrespective of system conditions. Hence under low or high renewables conditions, service availability remains relatively unchanged. Appendix B: Settlement Volume Expenditure versus Requirements provides more details on the settlement volumes.

There is sufficient contracted volumes of inertia to operate the power system securely at present up to 75% SNSP and with a minimum requirement for 8 conventional units to be running across the island (the TSOs are currently running a trial with this requirement reduced to 7 units). However, it is predominantly contracted on conventional plant that has a minimum generation level and hence produces MW's. In line with SEM-23-002[13],the TSOs are currently procuring Inertia from Low Carbon services, so that it continues to reduce the minimum requirement of conventional units on the system and therefore maximise renewable output and minimise future dispatch-down of RES-E.

One area where the TSOs would welcome increased volumes of services is in reactive power (SSRP) at times of low/zero renewables. The TSOs at times do observe high voltages on the power system and we believe there are low carbon providers who could provide an enhanced SSRP service above Grid Code requirements. The TSOs would welcome responses from those renewable providers on what level of SSRP tariff would be needed to enable that capability.

[13] SEM-23-002

6. DS3 Expenditure Analysis

DS3 expenditure is increasing year on year and there are two key drivers for this. Firstly, a significant amount of Fast Acting Technologies have successfully tendered for DS3 system services as part of the Volume Uncapped Arrangements. As illustrated in Section 5, these technologies make up a significant portion of contracted reserve volumes (FFR-TOR2). Installed capacities of Fast Acting Technologies has increased from 11 MW in 2021 to over 700MW following Gate 9 which took effect in October 2023. As highlighted in previous consultations[14], such technologies which are fast acting and offer high availability can significantly benefit from both fast acting and Temporal Scarcity Scalars (TSS).

TSS are the second reason for the upward trend in DS3 Expenditure, these apply at times of high System Non-Synchronous Penetration (SNSP). When SNSP levels are between 60% and 70%, DS3 payments to system services providers are multiplied by a TSS of 4.7, which increases to 6.3 when SNSP exceeds 70%. These scalar values were originally set in 2017 per SEM 17-080[15] to support reaching SNSP operational levels of 75% as part of government 2020 renewable energy targets. The SNSP limit has been steadily increased and in April 2022, the SNSP limit was raised from 70% to 75%. The higher SNSP limit, in conjunction with the ongoing connection of additional variable renewable generation to the grid, is resulting in more trading periods where the higher TSS value of 6.3 applies.

In order to illustrate the impact of increasing TSS scalars, an average monthly and annual TSS is calculated. This is simply the average TSS of all the trading periods in a particular month and year respectively. Table 22 below shows the significant increase in overall DS3 expenditure, that of Fast Acting Technologies and the rise in average annual TSS values, as the power system is operated at higher levels of SNSP. Without any mitigation measure this trend is set to continue, it is estimated that 180MW of additional fast acting technology could provide system services in 2024.

All monies in nominal prices	DS3 Expenditure (€M)	Fast Acting Technologies Expenditure (€M)	Average Annual TSS
20/21 Tariff Year	145	<10[16]	1.45
21/22 Tariff Year	199	58	1.60
22/23 Tariff Year	281	105	1.96
2023 Calendar Year	306.9	118	2.08

Table 22 DS3 Expenditure and TSS

Information is shown on a monthly granularity in Figure 99 below. It is also evident that there is significant volatility associated with average monthly TSS values and a very strong correlation between average monthly TSS and monthly DS3 expenditure. Given the volatility associated with TSS, forecasting of DS3 expenditure is very difficult and very sensitive to forecast SNSP assumptions.

[14] DS3-System-Services-Consultation-16-Sept-2022.pdf (eirgrid.ie) https://www.eirgridgroup.com/site-files/library/EirGrid/DS3-System-Service-Tarrif-Review-Consultation_28-05-2021.pdf

[15] SEM-17-080_DS3_SS_SEMC_Decision_Paper_Regulated_Arrangements_Tariffs_and_Scalars_Final version.pdf (semcommittee.com)

[16] Exact figure not shown due to confidentially reasons (not enough providers)

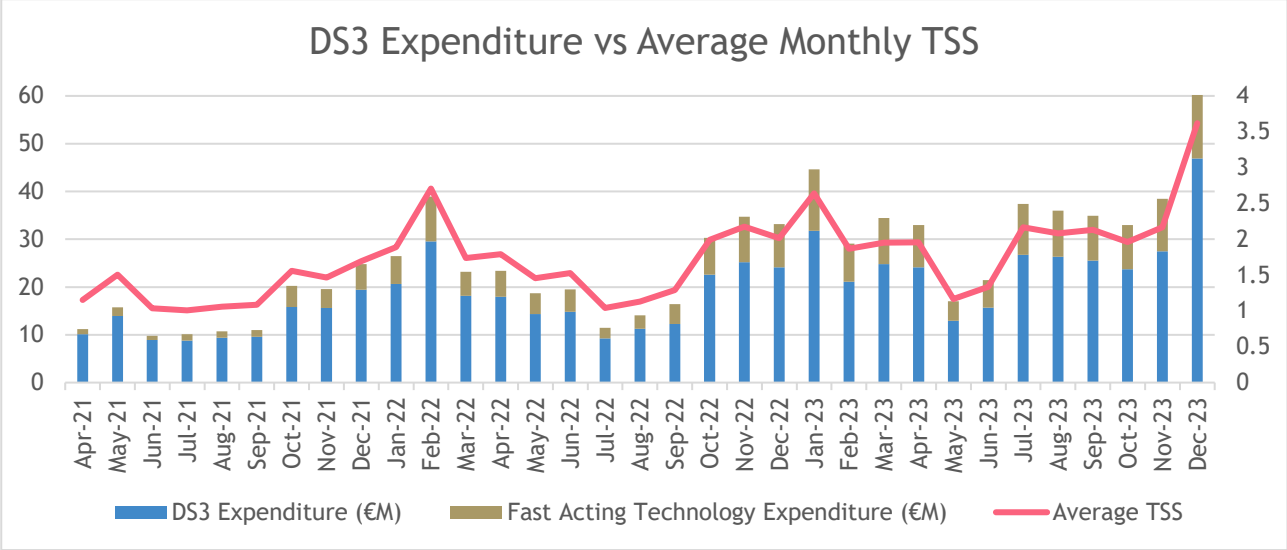


Figure 99: Monthly DS3 Expenditure and average TSS

For 22/23 tariff year, a breakdown of expenditure by service and technology is also illustrated in Figure 1010 below:

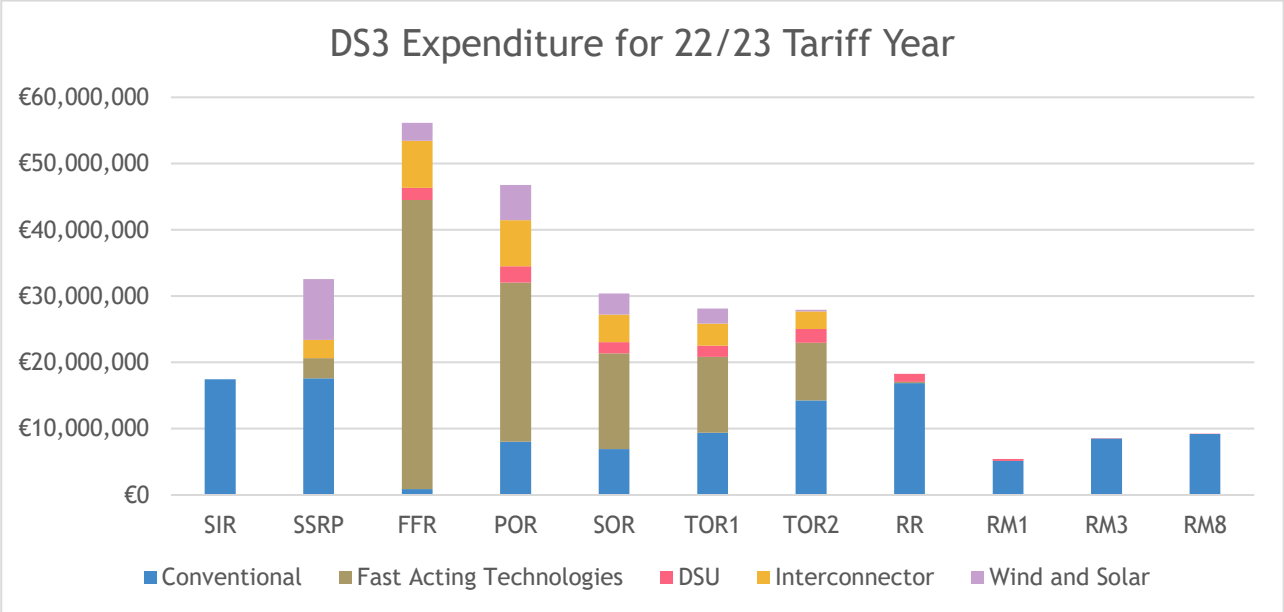


Figure 1010: DS3 Expenditure by Technology Type

It is evident that FFR-TOR2 makes a considerable portion of overall expenditure, with almost 50% of the expenditure for these services attributed to Fast Acting technologies. Expenditure for FFR alone was ~€56M with €43M of this associated with Fast Acting Technologies. Expenditure for this service is especially high as a Fast Acting Scalar of 3 is applied for a lot of fast acting units, in addition the Continuous Provision Scalar (for units that provide FFR-TOR1) of 1.5 is also applied to FFR payments.

7. Proposed Options for Reducing DS3 Expenditure

Given the contractual arrangements for DS3, there are limited options available to reduce DS3 expenditure. As it is not possible to amend individual DS3 agreements (the TSOs currently have in excess of 250 individual DS3 agreements) without mutual consent of contract holders[17], the only viable options are to adjust parameter values not defined within DS3 agreements.

This DS3 System Services Protocol document is supplementary to the DS3 System Services Agreement. It provides information on Operational Requirements and Performance Monitoring requirements that need to be satisfied by Service Providers and their respective Providing Units as part of the DS3 System Services contractual arrangements. This document also outlines the TSS values and changes to the Protocol can be made subject to industry consultation and regulatory approval. The latest version (version 4) was published in December 2022[18].

The DS3 System Services Statement of Payments is also supplementary to the DS3 agreement and tariffs can be amended subject to consultation and regulatory approval.

Based on contractual arrangements, it is therefore only possible to amend TSS values or tariff rates. It is also an option to close off procurement of system services to new entrants.

It is also worth highlighting that adjusting tariff rates or TSS values for individual technologies is also not a feasible option, per the rules of a Qualification System (the system that is in place to enable interested parties to submit a Response and subsequently qualify for award of Contract for provision of DS3 System Services) which is in keeping with United Kingdom and wider European policies for meeting renewable energy targets, the TSOs adopt a technology neutral position.

Taking in to account the above, there are three primary levers that could be used individually or in combination to reduce future DS3 Expenditure:

- A reduction in Temporal Scarcity Scalar (TSS) values for all system services,
- A reduction in tariffs,
- Cease procurement of certain system services.

While each option is presented as a standalone option, the SEM Committee may consider a combination of the proposed options i.e. change TSS values and adjust Tariffs.

[17] This prohibits implementing a reduction in fast acting scalars and introduction of any new scalars.

[18] DS3-SS-Protocol-v4.0.pdf (eirgrid.ie)

1. Reduction to Temporal Scarcity Scalar (TSS) values

The latter part of 2022/23 was a high SNSP period which significantly contributed to an increase in DS3 expenditure. The first three months of the 23/24 tariff year also had very high SNSP levels driven by renewables and high interconnector imports. December 2023 set a new record for SNSP levels with 463 trading periods with SNSP levels between 60% and 70% and 412 exceeding 70%. This is illustrated below in Figure 1111:

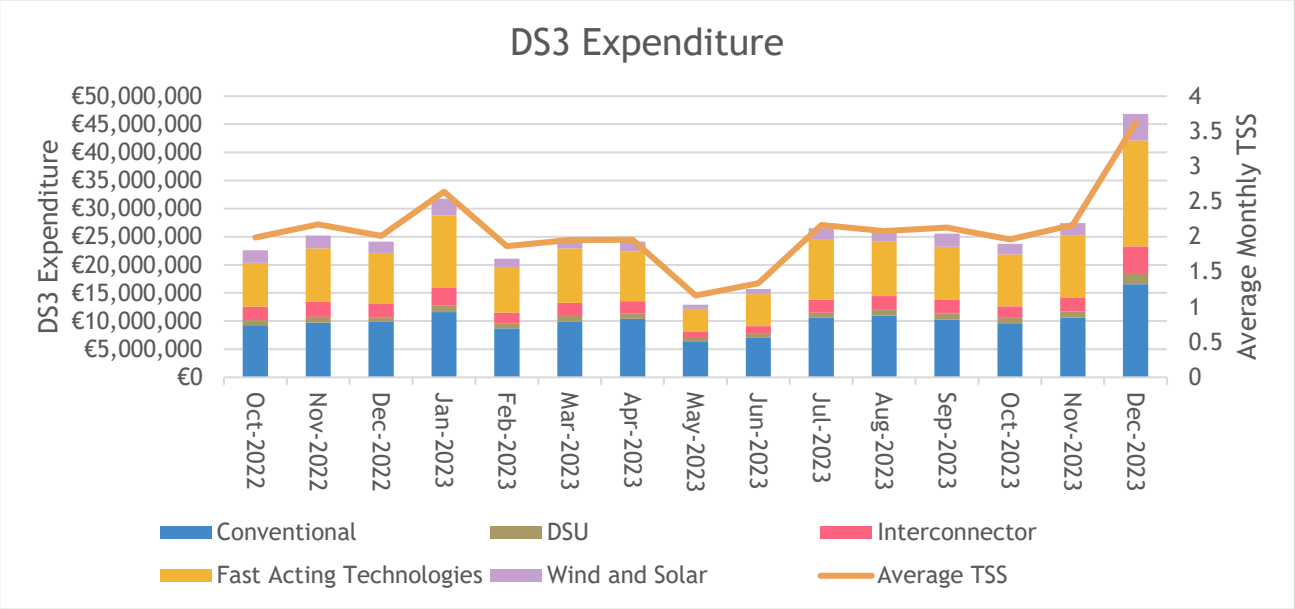


Figure 1111: DS3 Expenditure

Analysis shows that reducing TSS scalars can significantly reduce expenditure. Taking 22/23 tariff year as an example, different TSS scalars were applied retrospectively to show the implications on DS3 expenditure. These are shown in Table 33 below:

	TSS Scalars	Average TSS	Annual Expenditure (€M)
SNSP between 60% and 70% (current scaler)	4.7	1.96	280.98
SNSP greater than 70% (current scaler)	6.3		
SNSP between 60% and 70%	3	1.58	227.12
SNSP greater than 70%	5		
SNSP between 60% and 70%	2	1.35	193.46
SNSP greater than 70%	4		
SNSP between 60% and 70%	1	1	143.09
SNSP greater than 70%	**1**		

Table 33 TSS scaler reductions and effect on Expenditure

Given that the power system now operates routinely at higher SNSP levels, the TSOs consider that the incentive to be available at high SNSP levels should be reduced (i.e. there should be a reduction in the TSS). Rather the incentive is to always be available. Reducing TSS values also has the benefit of reducing volatility associated with DS3 expenditure.

It should be noted that TSS values are published in section 6 of the DS3 System Services Protocol – Regulated Arrangements v4.0[19]. If SEM Committee decision is to change these values, then the DS3 System Service Protocol - Regulated Arrangements document will be updated and republished. There will not be a further consultation as would normally occur for changes to this Protocol.

In Appendix A, further analysis on the impact of renewables and interconnector flows on SNSP is presented. This highlights the significant changes the TSOs have observed in net Interconnector flows and the resulting effect on SNSP. In summary the TSOs have observed an increase in interconnector imports driven by market schedules. This increases SNSP and it turn results in higher expenditure via the TSS.

[19] https://cms.eirgrid.ie/sites/default/files/publications/DS3-SS-Protocol-v4.0.pdf DS3-SS-Protocol-v4.0.pdf (soni.ltd.uk)

2. Reduction in Tariffs for Reserve Services

Another option available is to reduce tariff rates for FFR – TOR2 services, where it has been demonstrated in section 5 that contractual volumes exceed requirements. Total expenditure per service for the 22/23 tariff year is below in Table 22.

System Service	Expenditure
SIR	€17,445,203
SSRP	€32,564,249
FFR	€56,171,549
POR	€46,780,309
SOR	€30,419,492
TOR1	€26,136,880
TOR2	€29,958,030
RR	€18,279,560
RM1	€5,455,153
RM3	€8,535,681
RM8	€9,221,817

Table 44: DS3 Expenditure for Tariff year 2022/23

It is shown that FFR-TOR2 services total €189m while total expenditure for the tariff year is €281m. It is evident that a very significant reduction in rates for FFR-TOR2 would need to be implemented to have a significant impact on reduction of DS3 expenditure. Using 22/23 expenditure data, a reduction in FFR-TOR2 rates of approximately 25% would have been required to keep expenditure at €235m. It is also important to note, there were record SNSP levels in December 2023 where expenditure rose to €47m for this month alone. Future reductions in tariffs would require consideration of the possibility of very high SNSP months such as this, as well as future increases in system service provision from fast acting technologies. In the event that outturn SNSP levels were lower than forecast, this could result in tariffs being cut more than necessary.

3. Ceasing procurement of certain System Services

As shown in the volume analysis, the TSOs have an excess of system services in some areas. For example this would be FFR, POR, SOR TOR1 and TOR2. The TSOs consider that an option would be to stop the procurement of these services from Gate 11 onwards.

4. Reactive Power Tariff Review

The TSOs are aware that certain technologies (e.g. renewables at low or zero output) could provide more reactive power (SSRP) volumes but it appears that the current tariff will not recover the costs of enabling the enhanced service. The TSOs would welcome responses in this area and in particular an indication of the level of tariff that would be required to test and commission and cover an enhanced SSRP service provision.

More detail on the expenditure impact of the proposals on technology type can be found in Appendix C: Forecast Expenditure Impact of changes in TSS and Tariffs. This analysis looks out to Q2 2025 and the impact of reducing TSS and tariffs in relation to technology type.

8. Consultation Questions

Question 1

On the transition to FASS, what is your view on how the current System Services Tariffs and scalars should evolve over the next couple of years?

Question 2

Do you agree that as we transition to FASS that TSS should reduce to 1?

Question 3

Do you agree that as we transition to FASS that Tariffs (FFR-TOR2) should reduce?

Question 4

What are your views on ceasing procurement for certain system services where there is an excess?

Question 5

TSOs have indicated that high voltages are observed on the power system at low demand periods and low renewables. Could service providers who could provide enhanced services at low renewable outputs respond on the reasons it is not offered and what SSRP Tariff would be needed to incentivise it?

Question 6

Are there any other comments / observations you wish to make in relation to this consultation?

Please mark any response as confidential if you do wish them to be published. All responses will be shared with Regulating Authorities.

9. Next Steps

Responses to the Questions are invited from all interested stakeholders. Responses should be submitted by email to DS3@eirgrid.com or ds3@soni.ltd.uk on or before 26 April 2024. We request that respondents use the following text in the subject of the email: Response to DS3 System Service Tariff Rate Amendments. Please indicate clearly whether the response is to be considered confidential. All responses will be shared with Regulating Authorities.

The TSOs will also notify industry stakeholders of the details of a workshop associated with this consultation shortly.

Responses will be collated and reviewed, before a final recommendation is made by the TSOs to the SEM Committee.

10. Appendix A: Interconnector Flow Analysis & SNSP

The TSOs have observed higher levels of interconnector imports across calendar year 2023 compared to the previous 9 years. Figure 1212 below shows in 2023 we observed a 10%[20] net import flow on the interconnectors with GB which is a significant change from the previous years.

Electricity Fuel Mix as Percentage of Demand - Calendar Year Figures:

	All Island									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Fuel Type	%	%	%	%	%	%	%	%	%	%
Coal	16.4%	18.4%	17.6%	12.9%	8.7%	3.5%	4.2%	9.4%	8.0%	4.2%
Oil	0.7%	1.1%	0.8%	0.4%	0.4%	0.7%	1.0%	3.6%	2.6%	0.3%
NR Peat	6.8%	6.7%	6.1%	5.6%	5.3%	4.9%	2.3%	0.8%	0.6%	0.3%
Gas	44.9%	44.0%	51.7%	53.3%	50.5%	50.3%	50.7%	46.8%	50.7%	43.9%
Wind	18.0%	22.3%	20.6%	25.3%	28.6%	32.2%	36.4%	29.6%	34.1%	34.1%
Solar	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.6%	0.6%	0.5%	1.3%
Hydro	2.0%	2.2%	1.8%	1.8%	1.8%	2.3%	2.4%	1.9%	1.8%	2.3%
Other Renewables	1.8%	1.8%	2.6%	2.8%	3.3%	3.0%	3.2%	3.3%	3.1%	2.8%
Other Non-Renewables	0.2%	0.2%	0.2%	0.4%	0.8%	0.7%	0.8%	0.8%	0.8%	0.8%
Net Imports	9.4%	3.4%	-1.4%	-2.6%	0.5%	2.0%	-1.5%	3.3%	-2.2%	10.0%
Total Demand	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Renewables	21.7%	26.3%	25.0%	29.9%	33.7%	37.9%	42.6%	35.3%	39.5%	40.5%
Updated: Feb 2023										

Figure 1212: Net imports via HVDC Interconnectors

From the data, one needs to go back to 2014 to observe similar net interconnector flows. The SNSP[21] calculation is as shown below and it can be observed that as well as renewables increasing SNSP (Non – Synchronous Generation), Net Interconnector Imports will also increase SNSP. On the numerator side of the equation, increasing demand and/or Net Interconnector Exports will decrease SNSP.

$$\text{SNSP}(\%) = \frac{\text{Non} - \text{Synchronous Generation} + \text{Net Interconnector Imports}}{\text{Demand} + \text{Net Interconnector Exports}} \text{ x } 100$$

While the volumes of new renewables connecting on the island across 2023 has been modest the change in average SNSP has significant increased as shown in

Figure 13.

Compared to 2022 the main drivers for this change have been the SEM market price being higher than GB and Europe which has resulted in increasing imports from Europe into GB and then over to SEM.

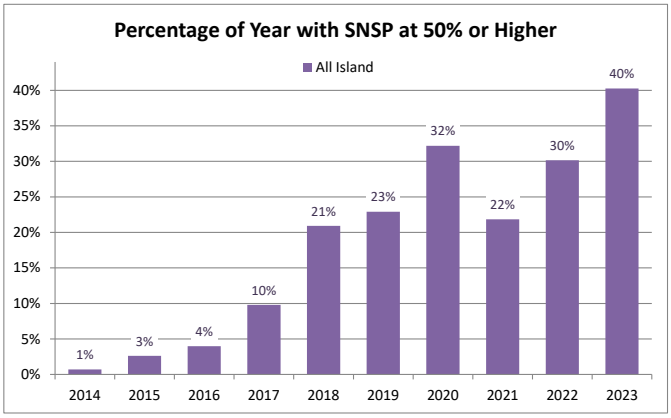


Figure 1313: SNSP above 50% in SEM

[20] System and Renewable Data Reports | Grid Information | EirGrid

[21] https://www.eirgridgroup.com/site-files/library/EirGrid/SNSP-Formula-External-Publication.pdf

The result is more periods where SNSP is high. Figure 1414 below shows imports on y axis versus wind generation for hourly period in SEM in 2023 and 2022. The SNSP is shown at 50% (green line), 60% (yellow line) and 70% (red line). It can be observed that in 2023 there are significantly more periods of operating at higher SNSP levels than in 2022.

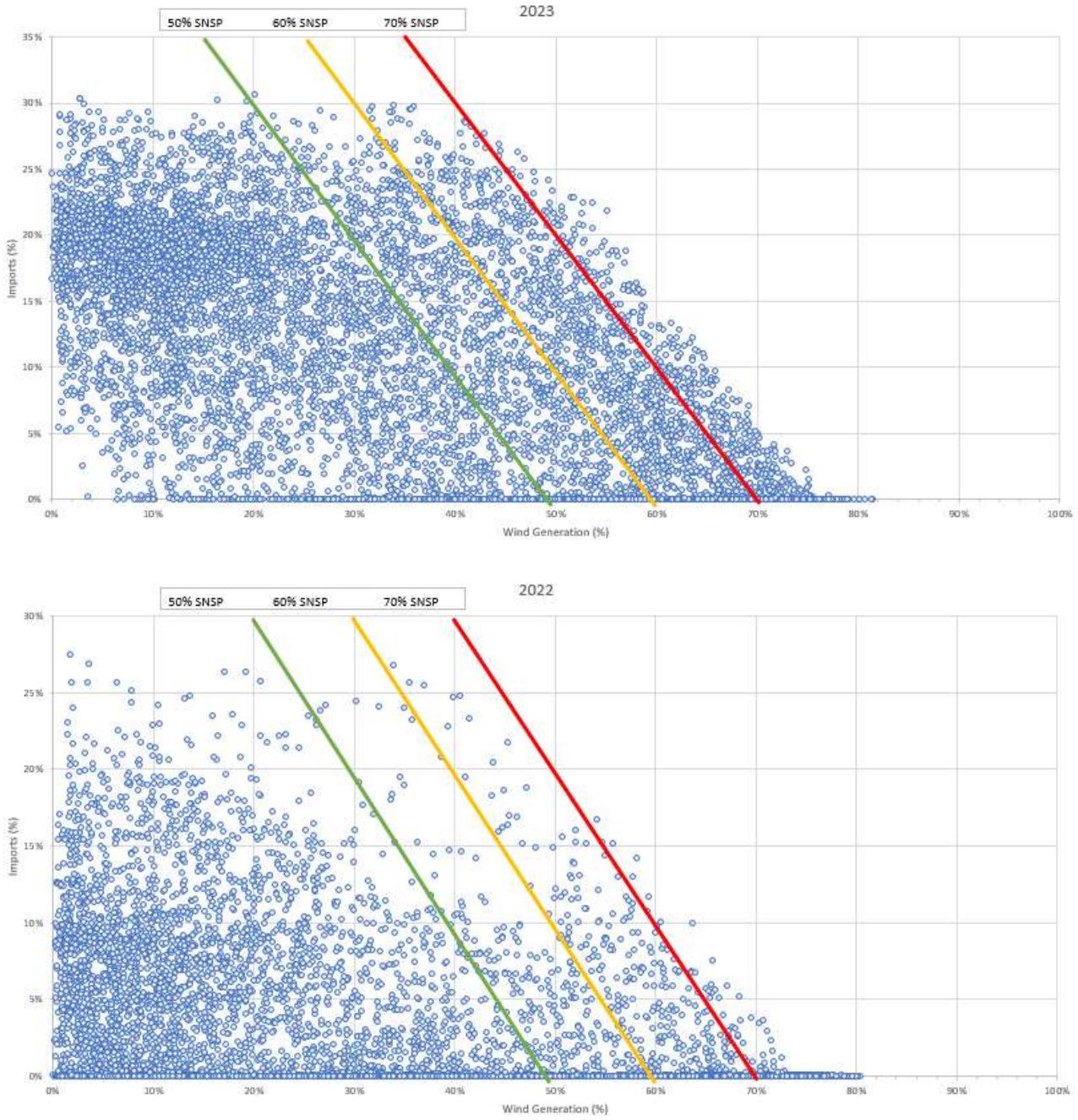


Figure 1414: Hourly periods when SEM importing versus wind generation in 2023 and 2022

11. Appendix B: Settlement Volume Expenditure versus Requirements

The TSOs report monthly to Regulating Authorities on the volumes and expenditures in system services that are settled versus the requirements. When this data is plotted across a year it highlights that for (POR to TOR2), there is little change in availability from fast acting providers irrespective of the time of the year. This is shown below in Figure 1515: Settled Volumes versus Requirement.

For other system services such as Ramping Margin, there is more seasonality in the data driven by planned outages.

For these graphs:

- Volumes settled in orange are in MW per settlement period across the month,
- Requirements in blue either come from a Plexos model or the real time systems.

Figure 1515: Settled Volumes versus Requirement

12. Appendix C: Forecast Expenditure Impact of changes in TSS and Tariffs (by technology type)

Section 7 highlighted at a high level the expenditure impact of proposals for this consultation. This Appendix goes into more detail to breakdown by technology type and forecasts into Q2 2025 based the following assumptions:

- Conventional includes Turlough Hill pumped storage and Synchronous Compensators.
- 2022/23 expenditure is used as a starting point i.e. a historic reference point.
- The TSOs then have included an estimate of connection of future fast acting technologies in future gates.
- Future changes in DSUs, Wind & Solar and Interconnector are not forecasted and based on 2022/23.

A base year forecast in expenditure is then established as shown below in Table 55.

	2024		2025		
	Q3 2024	Q4 2024	Q1 2025	Q2 2025	Totals
Conventional	€32,948,659	€37,052,928	€30,886,735	€24,133,236	€125,021,557
DSU	€3,120,064	€3,903,115	€3,044,928	€2,123,837	€12,191,944
Interconnector	€7,445,190	€9,532,617	€7,723,642	€4,702,929	€29,404,379
Fast Acting Technologies	€33,069,940	€54,443,362	€43,841,447	€28,982,317	€160,337,067
Wind & Solar	€6,619,818	€8,866,696	€6,619,466	€3,444,597	€25,550,577
					€352,505,522

Table 55: Expenditure forecast by technology type with no changes in Tariffs or TSS

The above shows that in with no changes in Tariffs or TSS then expenditure would be just over €350m based on the assumptions highlighted.

If the same analysis is run, keeping tariffs unchanged, but reducing the TSS to 4 (as opposed to 6.3) and 2.25 (as opposed to 4.7), then expenditure reduces to around €231m as shown below in Table 66.

	Q3 2024	Q4 2024	Q1 2025	Q2 2025	Totals	% Change
Conventional	€21,208,775	€21,172,742	€16,789,913	€23,717,860	€82,889,291	-34%
DSU	€2,008,359	€2,230,313	€1,655,211	€2,087,282	€7,981,166	-35%
Interconnector	€4,792,406	€5,447,117	€4,198,543	€4,621,984	€19,060,050	-35%
Fast Acting Technologies	€21,286,843	€31,109,965	€23,832,046	€28,483,480	€104,712,335	-35%
Wind & Solar	€4,261,121	€5,066,598	€3,598,317	€3,385,309	€16,311,345	-36%
					€230,954,186	

Table 66: Expenditure Forecast by technology type with TSS reductions

It can be observed that a reduction in TSS roughly affects all technology types equally as shown by the % Change column which compares the base year in Table 55.

If the same analysis is run, reducing the tariffs for FFR, POR, TOR1 and TOR2 by 53% (keeping TSS at unchanged current values), then expenditure reduces to around €235m as shown below in Table 77.

	2024		2025			
	Q3 2024	Q4 2024	Q1 2025	Q2 2025	Totals	% Change
Conventional	€27,596,521	€31,034,098	€25,869,534	€20,213,064	€104,713,216	-16%
DSU	€1,851,554	€2,316,243	€1,806,965	€1,260,358	€7,235,120	-41%
Interconnector	€4,302,720	€5,509,085	€4,463,644	€2,717,915	€16,993,364	-42%
Fast Acting Technologies	€18,004,921	€29,641,676	€23,869,465	€15,779,416	€87,295,478	-46%
Wind & Solar	€4,754,833	€6,368,703	€4,754,580	€2,474,159	€18,352,275	-28%
					€234,589,453	

Table 77: Expenditure Forecast by technology type with Tariff (FFR, POR,SOR,TOR1&2) reductions

It can be observed that tariff reductions across FFR to TOR2 impacts expenditure on low carbon reserve providers more than conventional. This is shown by the % Change column which compares the base year in Table 55.

While there are many combinations of the above in general, changing TSS roughly affects all technology types equally, while changing tariffs for FFR, POR, SOR, TOR1&2 has a noticeably higher expenditure impact on low carbon reserve providers than conventional.

Glossary

AGU	Aggregated Generator Unit. A number of individual generators grouping together.
DS3	Delivering a Secure, Sustainable Electricity System.
DSU	Demand Side Unit. One of more individual demand sites
FASS	Future Arrangements for System Services
FFR	Fast Frequency Response
FASS	Future System Services to replace current Regulated Tariffs
LCIS	Low Carbon Inertia Service
LSI	Largest Single Infeed
PIR	Phased Implementation Roadmap
POR	Primary Operating Reserve
RM	Ramping Margin. RM1 (margin at 1 hour), RM3 (margin at 3 hours), RM8 (margin at 8 hours)
RR	Replacement Reserves
RA	Regulating Authority
SEM	Single Electricity Market
SEMC	SEM Committee
SIR	Synchronous Inertial Response
SOR	Secondary Operating Reserve
SSRP	Steady State Reactive Power
SNSP	Synchronous Non-Synchronous Penetration
TOR	Tertiary Operating Reserve
TSO	Transmission System Operator. (SONI for N. Ireland and EirGrid for Ireland)
TSS	Temporal Scarcity Scaler