FASS: DASSA Parameters & Scalars

Consultation Paper

9 June 2025

EirGrid

Executive Summary

In September 2024, the SEM Committee (SEMC) published its decision[1] with respect to the recommended design for the Day-Ahead System Services Auction (DASSA)[2], that was submitted by the Transmission System Operators (TSOs) to the SEMC in July 2024. The TSOs have been progressing the development of the DASSA on foot of that SEMC decision. The SEMC decision further directed the TSOs to consult on elements of the daily auction design, a number of which are covered in this paper. In addition, there are some elements of the design that the TSOs had not previously consulted upon, which are also included.

The purpose of this consultation paper is to set out proposals across several functional areas to finalise the design of the DASSA arrangements for go-live:

Summary of Parameters and Scalars Consultation Proposals			
DASSA Qualified Volumes	Min and Max Service Volumes		
DASSA Pricing	Price Cap	Price Floor	Scarcity Price
DASSA Bidding	Max Number of P/Q Pairs	Min Step Size in P/Q Pairs	Auction Gate Window
Secondary Trading Matching	Schedule of Batch Matching	Batch Matching Clearing and Pricing	
Volume Insufficiency	Threshold for TSO Participation in Secondary Trading		
Commitment Obligations & Incentives	Pre-gate Closure: Compensation Payment	Post-gate Closure: Availability Incentives	Post-gate Closure: Delivery Incentives
Service Quality Value Function	Objective Function: Quality Value Function		
Bundles of Services	Implicit and Explicit Bundles		
Auction Fallback	DASSA Fallback Mechanism		

The proposals relating to DASSA Pricing and Commitment Obligations and Incentives are underpinned by detailed technical and economic analysis conducted in collaboration with AFRY, the TSOs' external partner. AFRY applied proprietary power market modelling to assess cost structures, opportunity costs, and the interaction between different incentive mechanisms. Their findings,

[1] SEM-24-066 Future Arrangements for System Services DASSA Market Design Decision Paper (semcommittee.com)
[2] DASSA Design Recommendations Paper (EirGrid); DASSA Design Recommendations Paper (SONI)

published alongside this consultation, provide the analytical and evidence-based foundation for the TSOs' proposals.

Our auction design partner DotEcon has also supported the TSOs in developing the Secondary Trading Clearing and Pricing proposals.

The TSOs have engaged with the RAs and their advisors NERA throughout the development of this consultation paper and have sought to incorporate their feedback into the proposals described herein.

Overview of TSOs' Proposals

Below is a high-level summary of the TSOs' proposals. For a detailed description of each proposal, please refer to the relevant sections of this consultation paper.

DASSA Qualified Volumes

The TSOs propose to maintain existing DS3 Regulated Arrangements system service volume limits for the DASSA. Under this proposal, service providers must be capable of delivering a minimum of 1 MW for each reserve service to qualify for participation in the daily auction. Maximum qualified volumes will be capped at 75 MW for each of the FFR sub-categories, POR, SOR, TOR1, and TOR2, and at 300 MW for Replacement Reserve (RR).

DASSA Pricing

The TSOs propose a Total Bid Price Cap of €500/MWh, and the £/MWh equivalent for Northern Ireland, to be distributed across the FFR, POR, SOR, TOR1, TOR2 and RR services based on their relative scarcity.

For the Bid Floor, the TSOs propose a value of €0/MWh and £0/MWh for each reserve service.

To address potential volume insufficiencies in the DASSA, the TSOs propose a Scarcity Price that is dynamically set as the maximum of the Total Bid Price Cap and the Day-Ahead Market (DAM) clearing price. The Scarcity Price will be distributed across individual reserve products as per the Total Bid Price Cap. The Scarcity Price will apply once a threshold for volume insufficiency is met.

DASSA Bidding

The TSOs propose several measures to finalise the bidding process for the DASSA:

- Each bid per service per Trading Period may include up to 10 price/quantity (P/Q) pairs.
- The minimum step size for bid prices will be €0.01/MW in Ireland and £0.01/MW in Northern Ireland.
- The minimum step size for bid quantity will be 0.001 MW.

The TSOs propose that the daily auction gate window will open at 11:45 AM day ahead (D-1).

These proposals maintain the core DASSA bidding process as approved by the SEM Committee in decision SEM-24-066[3].

Secondary Trading Matching

As per SEM-24-066, the matching of secondary trading of DASSA Orders is to be done on a batch basis. In this paper, the TSOs make proposals for the schedule of the batches and the clearing of secondary trades.

The TSOs propose that the batch process for matching Buy and Sell Orders will run every 30 minutes, immediately following the secondary trading gate closure for the Trading Period one hour ahead.

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[3] SEM-24-066 Future Arrangements for System Services DASSA Market Design Decision Paper (semcommittee.com)

Each batch will process all trades in the Order Book for Trading Periods from one hour ahead up to the final Trading Period covered by the daily auction.

Regarding the clearing of secondary trades and the establishment of a Secondary Trading Clearing Price, two mechanisms are proposed for consideration. Simple Matching will establish a unique Secondary Trading Clearing Price for each individual matched trade. The TSOs propose two sub-options for how secondary trades may be matched within this mechanism and describe their respective merits in terms of maximising social welfare and the quantity of trades.

The second mechanism proposed for the clearing of secondary trades is based on an Optimisation process, which aims to maximise social welfare (trade gains) by determining Secondary Trading Clearing Price(s) for all trades for a given system service and Trading Period. The TSOs have a preference for this optimisation-based approach due to its potential to deliver greater economic efficiency, but it is subject to DASSA go-live implementation considerations.

Volume Insufficiency

In situations where required service volumes are not procured in the DASSA, the TSOs propose defining the Volume Insufficiency Threshold to align with the value that the TSOs will set to cover the unavailability of reserve providers for any system service requirement / higher quality of service provision requirement / jurisdiction requirement, as per the TSOs' DASSA Volume Forecasting Methodology Recommendations Paper[4].

Commitment Obligations and Incentives

The TSOs propose a comprehensive framework of incentives to ensure service providers remain accountable for the reserve volumes they commit through the DASSA.

To incentivise DASSA Order Holders to maintain a market position compatible with their Order (Pre-Gate Closure Incentives), a Compensation Payment, payable to the TSOs, will apply proportionally to incompatible (lapsed) Orders at gate closure. The TSOs set out two proposals for the application of the Compensation Payment: that it should apply with exceptions (TSOs' preference) or to all lapsed Orders without exception.

Regarding the value of the Compensation Payment, the TSOs describe and evaluate several options against a number of criteria and propose a preference for the value to be linked to the delta between an adjusted DASSA clearing price and the actual DASSA clearing price, with the adjusted DASSA clearing price reflecting what the price would have been if the actual lapsed volumes had not participated in the auction. This proposal is subject to DASSA go-live implementation considerations.

To incentivise DASSA Order Holders to maintain availability to provide services in real-time (Post-Gate Closure Availability Incentives), the TSOs describe several options, including temporary exclusion from the daily auction, volume derating, and a one-off penalty, and express a preference that the Compensation Payment and an Availability Performance Scalar (reducing DASSA payments) will apply to unavailable DASSA Order volumes, subject to some exceptions.

The TSOs also propose incentives for DASSA Order Holders to deliver a service when called upon to do so (Post-Gate Closure Delivery Incentives), again including temporary exclusion from the daily auction, volume derating, and a one-off punitive payment, with an Event Performance Scalar (reducing DASSA payments) being the TSOs' preferred option.

The TSOs' proposed Commitment Obligation and Incentives framework is built on a clear hierarchy of impact: Post-Gate Closure Availability Incentives will be stronger than Pre-Gate Closure

[4] Section 4.2 (EirGrid); Section 4.2 (SONI)

Incentives, and the Post-Gate Closure Service Delivery Incentive will be sufficiently strong and greater than the applicable Availability Incentives over the subsequent Trading Periods.

Bundles of Services

The TSOs propose that the DASSA will procure only individual reserve services at go-live, with no provision for either explicit or implicit bundling. The TSOs will establish a separate workstream to evaluate the bundling of services and related mechanisms such as the linking of bids.

Service Quality Value Function

For the initial implementation of the DASSA, the TSOs propose setting the Service Quality Value Function to zero across all reserve services: this means that, beyond meeting any minimum dynamic service volume requirement, no additional preference will be applied for dynamic over static service provision during the auction clearing process.

DASSA Top-Up Mechanism

The TSOs have developed a proposal for the DASSA Top-up Mechanism, known as the Residual Availability Determination (RAD), which has been consulted upon. Given that this mechanism is subject to a TSO recommendations paper and subsequent SEMC decision, the TSOs do not make any additional proposals relating to the RAD but note some considerations that would need to be addressed should the RAD, or similar ex-post top-up mechanism, be implemented for DASSA go-live.

DASSA Fallback Mechanism

In the event that the DASSA platform becomes unavailable due to technical issues, the TSOs propose a fallback procedure to ensure continuity of service and settlement. The primary proposed fallback mechanism is the DASSA Top-up Mechanism, which is subject to SEMC approval. If the DASSA Top-up Mechanism is also unavailable, the TSOs propose that all available reserve volumes be remunerated at a predefined regulated tariff.

Consultation Process

The consultation will be open for seven weeks, closing on Friday 25 July 2025. Responses should be submitted via the EirGrid (link) or SONI (link) consultation portals.

Should stakeholders have any questions or comments during the consultation period these can be submitted to FASS@Eirgrid.com or FASSProgramme@soni.ltd.uk.

An industry workshop, at which the TSOs will present these proposals and facilitate a Q&A for interested parties, will take place as part of the Future Power Markets Industry Workshop on Wednesday 18 June 2025. A separate workshop to present worked examples and facilitate a further Q&A will be held in the subsequent weeks (the date and location of which are to be confirmed and will be communicated to customers and stakeholders in due course).

Contents

Glossary

Term or Abbreviation	Meaning
BCOP	Bidding Code of Practice
BESS	Battery Energy Storage System
BM	Balancing Market
CAPEX	Capital Expenditure
CCGT	Combined Cycle Gas Turbine
COD	Commercial Offer Data
DAM	Day Ahead Market
DASSA	Day Ahead System Services Auction
DS3	Delivering a Secure, Sustainable Electricity System
DSR	Demand Side Response
FAM	Final Assignment Mechanism
FASS	Future Arrangements for System Services
FFR	Fast Frequency Response
FPN	Final Physical Notification
GT	Gas Turbine
HLD	High Level Design
IDM	Intraday Market
IMR	Inframarginal Rent
LPF	Layered Procurement Framework
LRMC	Long-run Marginal Cost
PIR	Phased Implementation Roadmap
POR	Primary Operating Reserve
PQ pairs	Price-Quantity Pairs
RAD	Residual Availability Determination
RAs	Regulatory Authorities
RES	Renewable Energy Sources
RO	Reliability Option
RR	Replacement Reserve
SEM	Single Electricity Market
SEMC	Single Electricity Market Committee
SONI	System Operator for Northern Ireland
SOR	Secondary Operating Reserve
SSFA	System Services Future Arrangements
TOR1	Tertiary Operating Reserve 1
TOR2	Tertiary Operating Reserve 2
TSO	Transmission System Operator
V_m	Dynamic Time Scaling Factor
F_A	Availability Factor
Q_j	Performance Incident Scaling Factor
K_m	Monthly Scaling Factor
S_A	Availability Performance Scalar
S_E	Event Performance Scalar

Relevant SEMC Decisions

SEM-20-044	System Services Future Arrangements Scoping Paper
SEM-21-021	System Services Future Arrangements Decision Paper 1
SEM-22-012	System Services Future Arrangements High-Level Design Decision
SEM-23-103	System Service Future Arrangement Phase III: Detailed Design & Implementation Decision Paper
SEM-24-066	Future Arrangements for System Services DASSA Market Design Decision Paper
SEM-24-074	Future Arrangements for System Services Product Review and Locational Methodology Decision Paper
SEM-25-011	Future Arrangements for System Services Volume Forecasting Methodology Decision Paper

1 Introduction

1.1 Background

EirGrid plc is the licenced electricity Transmission System Operator (TSO) in Ireland, and SONI Ltd is the licensed TSO in Northern Ireland. It is our job to manage the electricity supply and the flow of power from generators to consumers. Electricity is generated from gas, coal and renewable sources (such as wind, solar and hydro power) at sites across the island. The high voltage transmission network then transports electricity to high demand centres, such as cities, towns and industrial sites.

We have a responsibility to facilitate connections to the power system including increased levels of renewable sources to generate on the power system while continuing to ensure that the system operates securely and efficiently. The respective TSO licences include a requirement for the relevant TSO to contract for the provision of system services.

Currently, under the DS3 System Services (Volume Uncapped) Regulated Arrangements, the procurement of system services is based on technical qualification and availability-based tariffs. In enabling a transition to a low carbon energy system and ensuring efficient procurement of relevant services, while ensuring compliance with EU requirements, there is a need to move to a more competitive procurement process.

1.2 System Services Future Arrangements

The System Services Future Arrangements (SSFA) programme was officially launched by the SEM Committee (SEMC)in July 2020 with the publication of a Scoping Paper (SEM-20-044)[5] for public consultation.

As set out in the SEMC's SSFA Decision Paper 1 (SEM-21-021)[6], the objective of the programme is:

> "*to deliver a competitive framework for the procurement of system services, that ensures secure operation of the electricity system with higher levels of non-synchronous generation.*"

In April 2022, the SEMC published the SSFA High-Level Design (HLD) Decision (SEM-22-012)[7]. The HLD set out a framework for the competitive procurement of system services, consisting of the following:

1. **Daily Auction Framework** for the procurement of some of the system services through a daily spot market
2. **Layered Procurement Framework (LPF)** comprising contracts with a term of more than a day and up to 12 months.
3. The existing **Fixed Contract Framework** to continue to be used to remove barriers to entry for new technologies with the use of more long-term contracts and ensure sufficient volumes of system services, as required.

[5] SEM-20-044 System Services Future Arrangements Scoping Paper (semcommittee.com)
[6] SEM-21-021 System Services Future Arrangements Decision Paper 1 (semcommittee.com)
[7] SEM-22-012 System Services Future Arrangements High-Level Design Decision Paper (semcommittee.com)

In December 2023, the SEMC published its SSFA Phase III: Detailed Design & Implementation Decision Paper (SEM-23-103)[8], in which it decided that the commercial arrangements as described in the HLD should be progressed by the TSOs.

In September 2024, the SEMC published its Future Arrangements for System Services DASSA Market Design Decision Paper (SEM-24-066)[9] with respect to the TSOs' recommended design for the Day-Ahead System Services Auction (DASSA)[10] that was submitted to the SEMC in July 2024.

Subsequent SEMC decisions that are relevant for this consultation are the Future Arrangements for System Services Product Review and Locational Methodology Decision Paper (SEM-24-074)[11], published in October 2024, and the Future Arrangements for System Services Volume Forecasting Methodology Decision Paper (SEM-25-011)[12], published in March 2025.

Each of the proposals contained in this paper will set out the relevant SEMC decision(s) for context.

1.3 Purpose of Paper

The purpose of this consultation paper is to set out proposals to finalise the design of the DASSA arrangements for go-live.

These proposals are summarised in Table 1 below.

Table 1: Summary of Consultation Proposals

Summary of Parameters and Scalars Consultation Proposals			
DASSA Qualified Volumes	Min and Max Service Volumes		
DASSA Pricing	Price Cap	Price Floor	Scarcity Price
DASSA Bidding	Max Number of P/Q Pairs	Min Step Size in P/Q Pairs	Auction Gate Window
Secondary Trading Matching	Schedule of Batch Matching	Batch Matching Clearing and Pricing	
Volume Insufficiency	Threshold for TSO Participation in Secondary Trading		
Commitment Obligations & Incentives	Pre-gate Closure: Compensation Payment	Post-gate Closure: Availability Incentives	Post-gate Closure: Delivery Incentives

[8] SEM-23-103 System Service Future Arrangement Phase III: Detailed Design & Implementation Decision Paper (semcommitte.com)
[9] SEM-24-066 Future Arrangements for System Services DASSA Market Design Decision Paper (semcommittee.com)
[10] DASSA Design Recommendations Paper (EirGrid); DASSA Design Recommendations Paper (SONI)
[11] SEM-24-074 Future Arrangements for System Services Product Review and Locational Methodology Decision Paper (semcommittee.com)
[12] SEM-25-011 Future Arrangements for System Services Volume Forecasting Methodology Decision Paper (semcommitte.com)

Service Quality Value Function	Objective Function: Quality Value Function		
Bundles of Services	Implicit and Explicit Bundles		
Auction Fallback	DASSA Fallback Mechanism		

1.4 Development of Parameters and Scalars Proposals

The TSOs have developed proposals relating to DASSA Pricing and Commitment Obligations and Incentives in this consultation paper in conjunction with our external partner AFRY. To formulate its recommendations, AFRY considered the underlying objectives for each of the design elements and performed supporting analysis, informed by AFRY's proprietary power market modelling, to evaluate potential impacts and interactions. The details on AFRY's approach, supporting analysis, and considerations are presented in their report[13], which is published alongside this consultation paper to support stakeholder review and engagement.

Our auction design partner DotEcon has also supported the TSOs in developing the Secondary Trading Clearing and Pricing proposals.

The TSOs have engaged with the RAs and their advisors NERA throughout the development of this consultation paper and have sought to incorporate their feedback into the proposals described herein.

The timeline for the development of this consultation is illustrated Figure 1 below in the context of selected DASSA design consultations, recommendations and SEMC decisions.

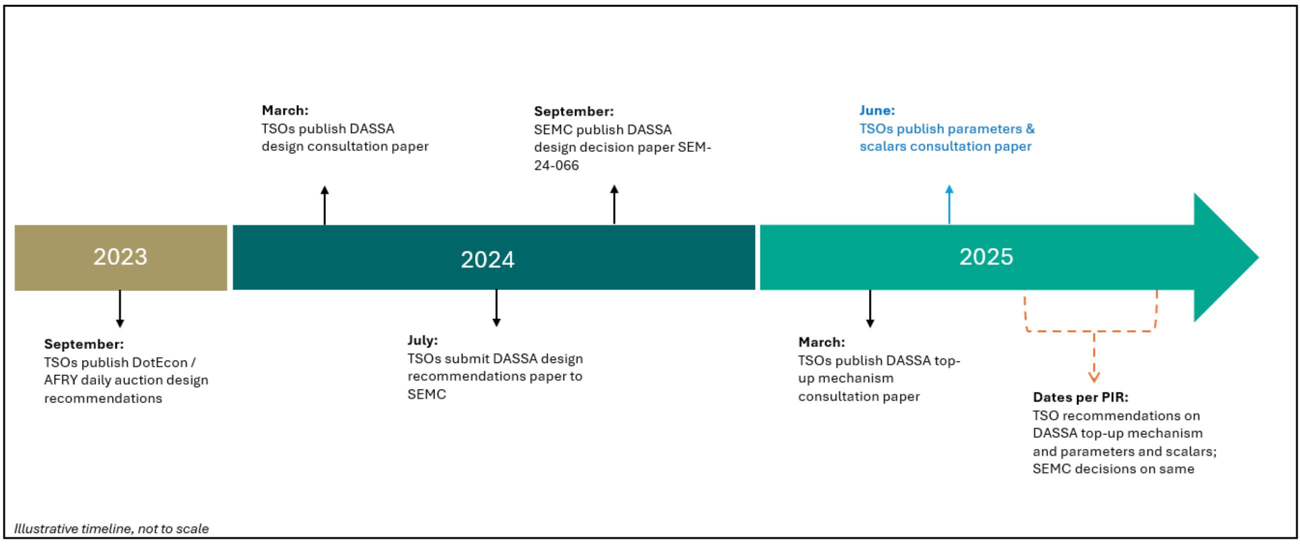

Figure 1: Timeline for Development of Parameters & Scalars Consultation

[13] AFRY Parameters & Scalars Report (EirGrid); AFRY Parameters & Scalars Report (SONI)

1.5 Structure of Paper

This paper is structured as follows:

- Section 1: Introduction
- Section 2: TSOs' Recommendations for FASS design
- Section 3: DASSA Qualified Volumes
- Section 4: DASSA Pricing
- Section 5: DASSA Bidding
- Section 6: Secondary Trading Matching
- Section 7: Volume Insufficiency
- Section 8: Commitment Obligations and Incentives
- Section 9: Bundles of Services
- Section 10: Service Quality Value Function
- Section 11: DASSA Top-Up Mechanism
- Section 12: DASSA Fallback Mechanism

1.6 Next Steps

This consultation will be open for seven weeks, closing on Friday 25 July 2025. Responses to the consultation should be submitted to the EirGrid (link) or SONI (link) consultation portals.

Should stakeholders have any questions or comments during the consultation period these can be submitted to FASS@Eirgrid.com or FASSProgramme@soni.ltd.uk.

An industry workshop, at which the TSOs will present these proposals and facilitate a Q&A for interested parties, will take place as part of the Future Power Markets Industry Workshop on Wednesday 18 June 2025. A separate workshop to present the worked examples and facilitate a further Q&A will be held in the subsequent weeks, (the date and location of which are to be confirmed and will be communicated to customers and stakeholders in due course).

Following this consultation, the TSOs will submit a recommendations paper to the SEMC for decision in October 2025, as per the timelines in the Phased Implementation Roadmap (PIR V3.0)[14].

[14] Phased Implementation Roadmap (EirGrid); Phased Implementation Roadmap (SONI)

2 TSOs’ Recommendations on DASSA Design

Table 2 below summarises the components of the FASS DASSA design as set out in the TSOs’ DASSA Design Recommendations Paper[15] (submitted to the SEMC in July 2024).

Table 2: Summary TSO DASSA Design Recommendations

Summary of TSO DASSA Design Recommendation Components	
Qualification	Process by which a party and unit register and qualify for system service products and be eligible for participation in the DASSA.
Procurement	Setting of the DASSA volume requirements, auction submission offers, creation of a supply curve, clearing of the auction (per product, zone and quality) and award of a cleared DASSA Order to service providers.
Secondary Trading	Capability of qualified service providers to actively trade cleared DASSA Orders (fully or partially) via Buy or Sell orders in secondary / bilateral trading.
Self-lapsing	Capability of a service provider with a cleared DASSA Order to self-lapse (fully or partially) its DASSA Order.
Commitment Obligations & Incentives*	Process by which the TSOs confirm, or lapse cleared DASSA Orders, apply Compensation Payments (if applicable), and incentivise DASSA Order Holders to make themselves available to provide a service in real time and deliver it when called upon to do so.
Final Assignment Mechanism**	Ex-post determination of real-time system needs, creation of an adjusted supply curve based on available service providers and clearing of the FAM of available service providers, in merit, for a given real-time volume requirement.
Settlement (Service Providers)	Managing invoicing and processing of DASSA, FAM and Compensation Payments.

The recommendations paper on the DASSA design was submitted by the TSOs to the SEMC in July 2024, following industry consultation. Separate consultations have been conducted with respect to other aspects of the FASS design (including the FASS Charge, Volume Forecasting Methodology etc).

Notes:

***** In our recommendations paper, the TSOs recommended the implementation of a high-level Commitment Obligation and Incentive process, noting that the value of the Compensation Payment and the detailed design of the real-time incentives (in the form of performance scalars), would be subject to the outcome of a separate future consultation (which is the purpose of Section 8 of this consultation paper).

[15] DASSA Design Recommendations Paper (EirGrid); DASSA Design Recommendations Paper (SONI)

** The Final Assignment Mechanism (FAM) was not approved by the SEMC in SEM-24-066[16]. The RAs and TSOs conducted a Joint Options Assessment to identify an alternative to the FAM. The outcome of this assessment was a proposal for a Residual Availability Determination (RAD). A TSO consultation on the RAD was published on 24 March 2025[17]; the consultation period closed on 2 May 2025. The next steps in this process are for the TSOs to develop a recommendations paper and submit to the SEMC for decision. Please see Section 11 of this paper for our considerations with respect to the RAD.

[16] SEM-24-066 Future Arrangements for System Services DASSA Market Design Decision Paper (semcommittee.com)
[17] DASSA Top-Up Consultation Paper (EirGrid); DASSA Top-Up Consultation Paper (SONI)

3 DASSA Qualified Volumes

3.1 Introduction

This section sets out the TSOs' proposals for the minimum and maximum volumes per service that may be procured from individual service providers in the DASSA at go-live.

3.2 Minimum and Maximum Service Volumes

3.2.1 Context

Currently, under the DS3 Regulated Tariff Arrangements, the TSOs apply minimum and maximum values to the volumes of each service that we contract with from service providers, as per Table 3 below.

Table 3: DS3 Regulated Tariff Arrangements Min and Max Volumes

System Service	Min Volume	Max Volume Normal Operation	Max Volume Requested by TSO
FFR	1 MW	75 MW	100 MW
POR	1 MW	75 MW	100 MW
SOR	1 MW	75 MW	100 MW
TOR1	1 MW	75 MW	100 MW
TOR2	1 MW	75 MW	100 MW
RRD	1 MW	300 MW	N/A
RRS	1 MW	300 MW	N/A

The 'Max Volume Requested by TSO' column refers to the maximum volume that the TSOs are willing to contract for with a service provider in exceptional system circumstances. Applicable service providers are only paid up to this volume in such circumstances; in normal operation, payments for the FFR, POR, SOR, TOR1 and TOR2 services are limited to a maximum volume of 75 MW.

3.2.2 Proposal

For DASSA go-live, the TSOs propose to continue to apply the 1 MW minimum and 75 MW maximum limits per contracted service provider for FFR to TOR2 and 300MW for Replacement Reserve, as set out in Table 4 below.

Table 4: Proposed DASSA Min and Max Volumes

System Service	Min Vol Dynamic Provider	Min Vol Static Provider	Max Vol Dynamic Provider	Max Vol Static Provider
FFR sub-category 1	1 MW	1 MW	75 MW	75 MW
FFR sub-category 2	1 MW	1 MW	75 MW	75 MW
FFR sub-category 3	1 MW	1 MW	75 MW	75 MW
POR	1 MW	1 MW	75 MW	75 MW
SOR	1 MW	1 MW	75 MW	75 MW
TOR1	1 MW	1 MW	75 MW	75 MW
TOR2	1 MW	1MW	75 MW	75 MW
RR	1 MW	1 MW	300 MW	300 MW

This proposal means that:

- Service providers must be capable of providing at least 1 MW of each of the reserve services to be eligible for participation in the DASSA arrangements for each service.
- Service providers will be limited to maximum qualified volumes of 75 MW for FFR (each sub-category), POR, SOR, TOR1 and TOR2 and 300 MW for RR that may be bid into the DASSA.
- These values will be captured in the System Services Register, which will regulate eligibility for participation in the daily auction.

3.2.3 Rationale

In moving from a system whereby all eligible service providers are incentivised through the DS3 Regulated Tariff arrangements to maintain availability to one where the TSOs will have to procure a fixed volume of reserves, the TSOs wish to minimise risks by ensuring as wide a variety of reserve providers as possible.

For the FFR-TOR2 service provision timeframe, the TSOs consider that the existing maximum volume of 75 MW in normal operation is appropriate. To avoid oscillatory behaviour of frequency-based activation of fast acting dynamic providers, careful consideration of required deadbands and trajectories will be necessary, and the TSOs consider that maintaining the maximum of 75 MW provision per unit will help mitigate this risk. Risks to system operation could also occur with large volumes of static reserve provision that may activate at certain deadbands and potentially cause increased frequency deviation; the TSOs have recommended that the maximum MW step size limitation per static service provider is 75 MW, as outlined in our DASSA Product Review and Locational Methodology Recommendations Paper[18].

For Replacement Reserve, considering the product timelines and the per unit limitation, the TSOs consider that the current 300 MW maximum provision per service provider limit should be maintained.

[18] DASSA Product Review and Locational Methodology Recommendations Paper (EirGrid); DASSA Product Review and Locational Methodology Recommendations Paper (SONI)

These proposals broadly account for existing qualified volumes under the DS3 Regulated Tariff Arrangements.

TSOs' Proposal:

Minimum and maximum service volumes to be implemented for the DASSA arrangements:

- Minimum volume of 1 MW for all reserve services.
- Maximum volume of 75 MW for FFR (each sub-category), POR, SOR, TOR1 and TOR2.
- Maximum volume of 300 MW for RR.

Question 1: Do you agree with the TSOs' proposals for the minimum and maximum reserve service volumes for the go-live of the DASSA arrangements?

4 DASSA Pricing

4.1 Introduction

This section sets out the TSOs' proposals for the following pricing components of the daily auction:

- DASSA price cap.
- DASSA price floor.
- DASSA scarcity price.

Specifically, the scope of this section is concerned with:

  - The requirement for the above-mentioned prices per service.
  - The value of the above-mentioned prices per service.

4.2 DASSA Price Cap

4.2.1 DASSA Price Cap Proposal Summary

The TSOs propose a Total Bid Price Cap of €500/MWh (and the £/MWh equivalent for Northern Ireland) to be allocated across all reserve services within each jurisdiction, as shown in Table 5 below. The same Total Bid Price Cap value will apply to upward and downward reserves.

A Bid Price Cap is preferred over a Clearing Price Cap for the DASSA.

Table 5: Proposed Bid Cap per Service (€/MWh)

Service	FFR*	POR	SOR	TOR1	TOR2	RR
Reserve Availability	135	94	81	74	72	44

Note:
*To apply to all FFR sub-categories.

A DASSA Trading Period will be 30 minutes in duration. The Bid Price Cap values presented above are on a per hour basis and will be halved accordingly when applied to a 30-minute Trading Period.

This Total Bid Price Cap, set at the level of the Reliability Option Strike Price (RO Strike Price), is proposed as it offers a good balance between allowing market efficiency (providing required price signals) and protecting consumers from excessively high prices.

4.2.2 DASSA Price Cap Context

A price cap in reserve markets is a predetermined maximum price for which reserve capacity can be procured. This mechanism is designed to protect final consumers and mitigate market power concerns.

In SEM-22-012[19], the SEMC decided that some form of price cap may need to be introduced should there be limited competition in the procurement of any service.

[19] SEM-22-012: Section 5.6 (semcommittee.com)

Subsequently, in our recommendations paper, the TSOs recommended that a price cap may be implemented, with the price of any maximum price to be determined, which may involve quantitative analysis and approval by the RAs[20].

In SEM-24-066[21], the SEMC decided that price caps will be allowed for in the design of the DASSA and requested the TSOs to consult on the methodology and conditions to apply to the use of price caps. The SEMC will decide upon the value and application of any price caps.

4.2.3 Price Cap Global Overview

AFRY conducted a review of some selected wholesale electricity and reserve markets as part of their report. The analysis indicates that all markets explored had a price cap in place to protect final consumers. However, AFRY suggests there is a lack of transparency regarding the methodologies used to determine the specific price cap levels. For more information on the study, please refer to Section 3.2 of AFRY's report.

4.2.4 Price Cap Design

4.2.4.1 Price Cap Design Considerations

The TSOs propose implementing a Bid Price Cap rather than a Clearing Price Cap as part of the DASSA auction design.

A price cap can be achieved either through restricting the bids submitted or by an explicit Clearing Price Cap. A Clearing Price Cap serves to limit the auction clearing price, integrating the specified cap value into the auction optimisation process. This mechanism ensures that the clearing price does not exceed the predetermined value. As this information is disclosed to all auction participants beforehand, there is minimal incentive to place bids that exceed this cap. On the other hand, a Bid Price Cap restricts the maximum bid allowable from each participant, functioning as an indirect Clearing Price Cap. In practice, both a Bid Price Cap and a Clearing Price Cap are designed to deliver similar results.

4.2.4.2 Price Cap Design Methodology Approach

The DASSA will function as a daily auction, expecting sufficient competition on most days. However, some periods may experience scarcity and reduced competition. A Bid Price Cap set too low may significantly limit service provider income, potentially deter new entry and/or result in service provider exit. On the contrary, a very high Bid Price Cap may have minimal impact under strong competition, as competitive pressures can maintain prices below the cap. In cases of market concentration, a high Bid Price Cap could result in excessive costs on consumers.

This section of the consultation paper presents the approach used to design the Bid Price Cap. As described in AFRY's report, the purpose of the Bid Price Cap is to ensure consumer protection, by managing the cost to consumers and minimising any potential impact from the exercise of market power, while also maintaining market efficiency by allowing bids to reflect actual operating and opportunity costs to the greatest extent possible.

[20] Section 3.6 & Section 3.10 (EirGrid); Section 3.6 & Section 3.10 (SONI)
[21] SEM-24-066: Section 2.6 (semcommittee.com)

AFRY, in their report, focus on understanding the factors behind costs - both operational and opportunity - incurred by some traditional reserve providing units at the time of making reserve capacity available.

The objective of the Bid Price Cap design is therefore to ensure that:

- Any cap applied is at least equal to the short-run cost of operation, so that all service providers can recover such costs in any given period; and
- When considering remuneration over a longer period, efficient service providers can recover their long-run marginal costs, assuming a reasonable operational profile.

The estimation of these costs is challenging given the diverse range of service providers with varying cost structures and the potential emergence of new types of service providers in the future. To support this analysis, AFRY concentrated on identifying the actual and opportunity costs faced by more 'traditional' reserve service providers across three scenarios that represent different market conditions:

1. Actual and opportunity cost of a synchronised CCGT
2. Actual cost of provision for an unsynchronised CCGT
3. Cost Recovery of a Dedicated BESS Unit

These scenarios are evaluated in detail below.

1. Actual and Opportunity Cost of a Synchronised CCGT

AFRY first evaluated the actual and opportunity costs of a synchronised CCGT. The CCGT will participate in the DASSA only if it can recover its short-run marginal costs and the expected earnings are equal to or greater than those from subsequent energy markets, such as the IDM. The factors influencing these costs are summarised in Table 6 below.

Table 6: Factors Influencing Actual and Opportunity Costs for a CCGT in Providing Upward and Downward Reserves

Cost	Upward Reserve	Downward Reserve
'Actual' cost *(change in variable operating cost due to efficiency at different loading levels)*	Higher average variable operating cost (operating at lower loading level)	Lower average variable operating cost (operating at higher loading level)
Opportunity cost *(foregone inframarginal rent)*	Depends on expected intraday market prices and variable operating cost	Depends on expected intraday market prices and variable operating cost

The opportunity cost of a synchronised thermal generator depends on the expected foregone inframarginal rent.

To further explore this, AFRY analysed the opportunity costs linked to upward and downward reserves by evaluating three different commodity price scenarios to determine the short-run operating costs of the units, and the resulting electricity prices, as illustrated in Figure 2 below:

- Case 1 generally reflects the current market conditions.
- Case 2 is more in line with AFRY's mid-term view; and
- Case 3 represents a more extreme set of assumptions, informed by the recent gas crisis.

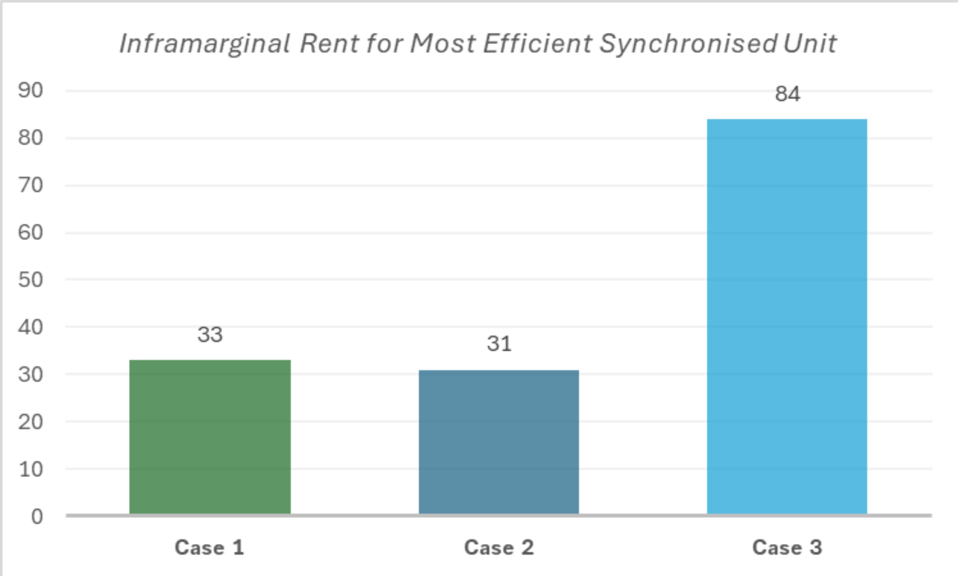

Figure 2: Inframarginal Rent for Most Efficient Synchronised Unit

AFRY assumes that the electricity price is set by the short-run marginal cost of the most expensive CCGT unit on the system:

- For upward reserves, any cap should, at a minimum, reflect the inframarginal rent earned by the most efficient CCGT from its participation in the energy market, when the least efficient CCGT or GT units clear the market.
- For downward reserves, the rationale is similar. If prices in the intraday market fall below a unit's variable operating cost, the unit should be allowed to include in its bid the opportunity cost of buying back energy in the intraday market and thereby withdrawing from the energy market. In this context, the cost is determined by comparing the variable operating cost of the most expensive unit with the intraday price set by the 'cheapest' unit, resulting in the same difference as that for upward reserves.

2. Actual Cost of provision for an Unsynchronised CCGT

For demonstration purposes, potential offers from an unsynchronised CCGT are also explored, as illustrated in Figure 3 below, assuming the need to recoup their entire operational costs through the DASSA.

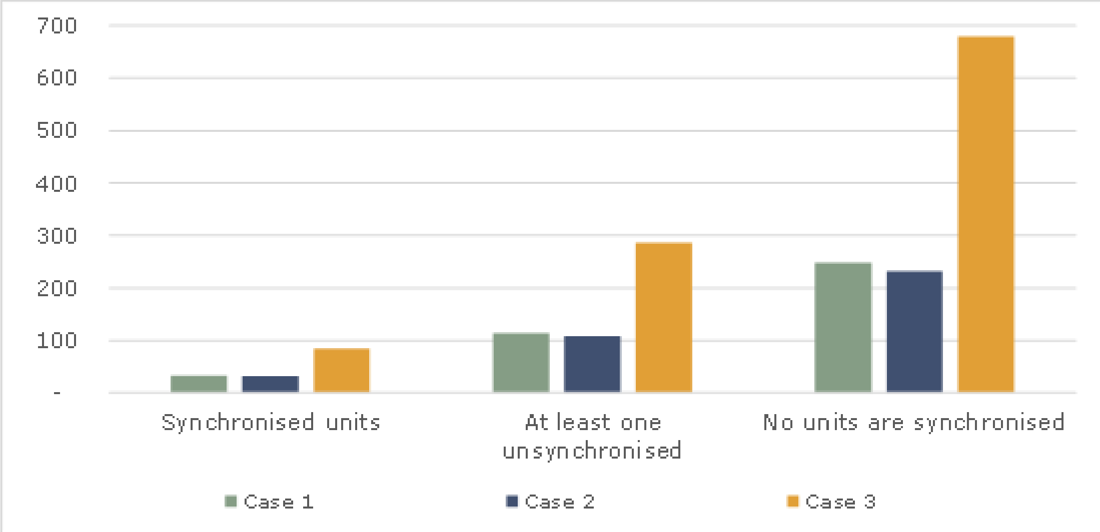

Figure 3: Bid Price Cap Based on Unsynchronised CCGT units

A CCGT could be 'out of merit' and may not be scheduled in the DAM. In this case, the CCGT would either not participate in the DASSA or would submit a DASSA bid that allows recovery of the entirety or part of its start-up cost. In practice, unsynchronised CCGTs will typically be uncompetitive in the DASSA, particularly given potential provision from alternative providers, such as BESS. It is also generally understood that units will attempt to recover synchronisation costs through the energy markets (either in the ex-ante markets or the Balancing Market).

3. Cost Recovery of a Dedicated BESS Unit

Some short-duration batteries are primarily focused on providing reserves, with their business models centred around frequency response and reserve markets rather than energy arbitrage. Reserve markets should enable these units to fully recover their costs, including fixed costs. The Bid Price Cap should be set at a level that allows storage to recover its long-run marginal costs based on a given operating profile.

While the DASSA is not expected to consistently clear at prices that reflect the reserve provision costs of these units, it remains important that the Bid Price Cap allows market participants to recover short-run marginal costs in every period and long-run marginal costs under a reasonable operating pattern, while also preventing exploitative bidding behaviour. Based on the analysis conducted by AFRY, which illustrates the reserve income needed for achieving economic viability for different types of BESS, contingent on the number of operational hours (i.e., hours with a DASSA Order).

The costs for the hypothetical battery units are categorised as follows:

- A hypothetical 1.5-minute reserve includes FFR-SOR,
- A 5-minute reserve includes up to TOR1,
- A 20-minute reserve includes up to TOR2, and
- A 1-hour reserve includes up to RR

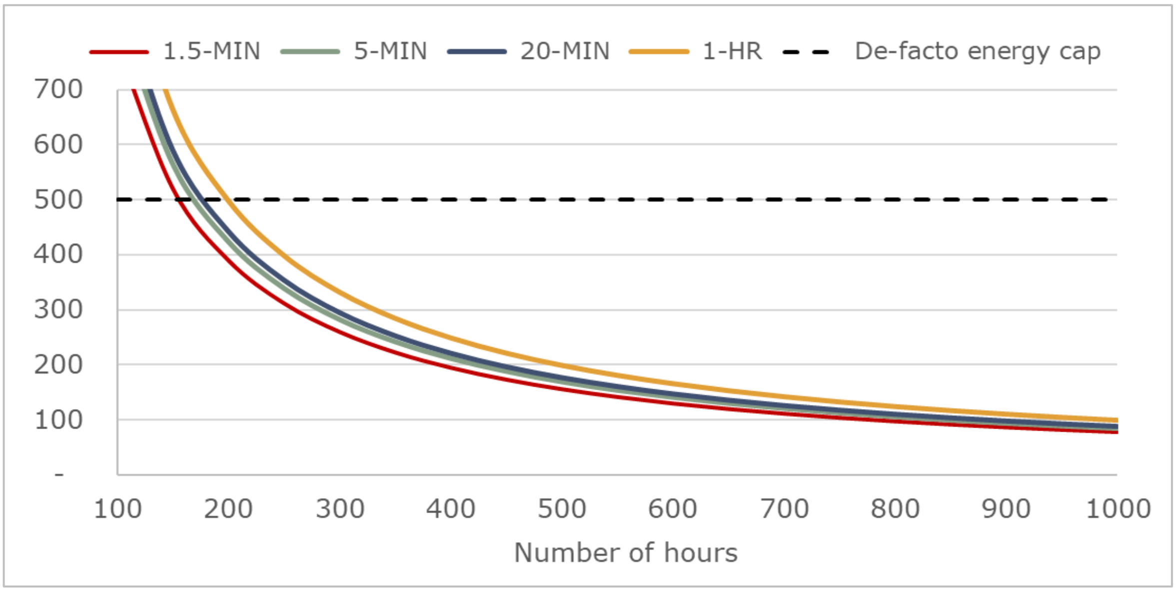

Figure 4: Total Required Reserve Payment per Battery Type per Number of Hours

AFRY has developed ‘hypothetical’ battery sizes to represent units with the precise capabilities to incrementally provide various services. The associated cost data for these BESS units were used to calculate their annualised costs. Assuming that these annualised costs must be recovered solely through revenue from the DASSA, disregarding any potential income from energy arbitrage, AFRY plots the required total price for all the reserves that each hypothetical unit can deliver to ensure full cost recovery, including a reasonable rate of return, as a function of DASSA operating hours.

The graph in Figure 4 clearly shows that as the number of hours covered by the awarded DASSA contract increases, the required prices decrease in a non-linear fashion. It is also acknowledged that a dedicated BESS unit can provide reserves for more hours than the 1000-hour cut-off illustrated in the graph. The purpose of this graph is to demonstrate the relationship between the required reserve prices and the ‘indirect’ cap affecting most resources in the market. Notably, the RO Strike Price of 500 EUR/MWh, acting as this ‘indirect energy cap’, corresponds to the price a dedicated BESS unit would need if it operated for 200 hours to recover its annualised costs.

4.2.4.3 Bid Price Cap Distribution per Reserve Type

With the proposed Total Bid Price Cap of 500 EUR/MWh set at a level consistent with energy markets, it is still necessary to distribute this cap across the various reserve products. Drawing on AFRY’s analysis, the TSOs have evaluated three different approaches, as detailed in

Table 7 below. The TSOs have a preference for the ‘Reserve Availability’ approach.

Table 7: Approaches for Allocation of Bid Price Cap per Service

#	Methodology Approach	Description
1	**Battery Incremental Cost-based Approach**	Expanding on the Battery-based approach described in section 3.4.4 of the AFRY report, this approach analyses the variations in costs associated with incrementally defined hypothetical battery durations that meet the reserve response requirements for different reserve products. Using this approach, the marginal cost of providing an additional reserve type is isolated.

2	**Reserve Availability Approach**	Analysing the projected total reserve availability establishes the relative scarcity of each product. A technique is then adopted to assign a higher value to the scarcer products.
3	**DS3 Tariff Ratio Approach**	A simple relativity approach is considered based on the value assigned to each product under the current volume uncapped DS3 arrangement.

Distributing the Total Bid Price Cap allows a service provider capable of contributing equally to all reserve products and offer capacity for the entire FFR-RR 'bundle' to capture a total value equivalent to that available in the energy markets during periods of system tightness.

After establishing the Total Bid Price Cap for all services, the next step involves distributing specific cap levels to each individual service using the three methodologies outlined in Table 7. The detailed breakdown of the calculations performed for all three methodologies is presented below are derived from the AFRY report's analysis.

1. Battery Incremental Costs

Using the Total Bid Price Cap derived from the battery approach, as described in AFRY's report, the potential allocation factors can be calculated. The results of the split based on the Battery Incremental Costs approach are illustrated in Figure 5 below:

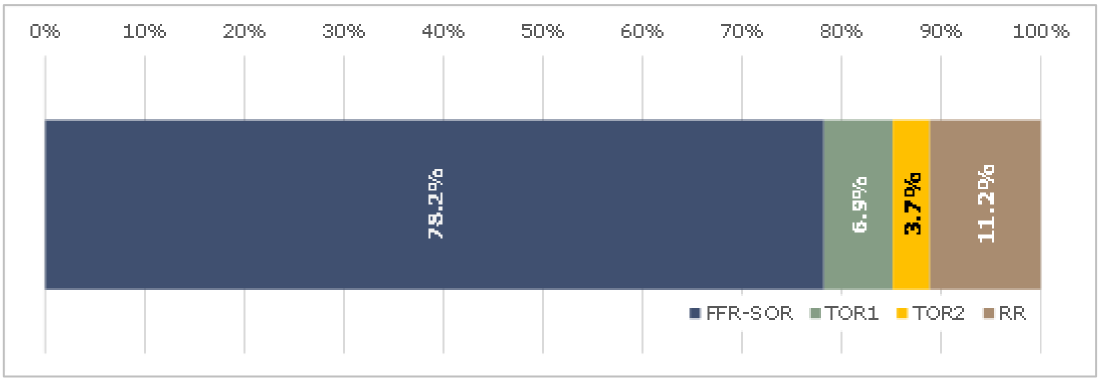

Figure 5: Battery-Based Approach Price Cap Split factors

Figure 5 shows that that the FFR to SOR 'bundle' represents the largest portion of the split, accounting for 75.2% of the total Bid Price Cap. This is primarily because the underlying CAPEX values for the 'hypothetical' units considered by AFRY could not be further split into the individual fast response products captured by the FFR-SOR bundle.

To address this issue, AFRY applied the corresponding ratios derived from the second method, the Reserve Availability Approach, to divide the FFR-SOR 'bundle', thereby creating a hybrid approach. For simplicity, the Bid Price Caps for individual reserve products calculated using this hybrid method are still referred to as the 'Battery Incremental Cost-Based Approach'.

2. Total Availability of Reserve per Service

AFRY's analysis presents a second approach that distributes the Total Bid Price Cap value according to the Total Available Reserve for each service. This method employs an inverse proportionality technique to ensure that services with lower availability levels are appropriately represented in their respective pricing caps. To apply this approach, the total potential resource capacity is estimated, as shown in Table 8 below.

Table 8: Total Available Reserve per Service (MW) for 2027

Unit	FFR*	POR	SOR	TOR1	TOR2	RR
Conventional thermal	435	981	1450	1710	2656	5660
DSR	213	247	262	339	349	483
Wind and solar	0	394	411	403	0	0
Interconnection	225	225	225	225	225	0
Batteries	1320	1320	1320	1320	884	608
Total	**2193**	**3167**	**3669**	**3997**	**4113**	**6751**

Note:
Values are based on an FFR minimum response time of 1 second.

Figure 6 below illustrates the allocation of the Bid Price Cap for each service, which is determined by the inverse calculation described in the AFRY report.

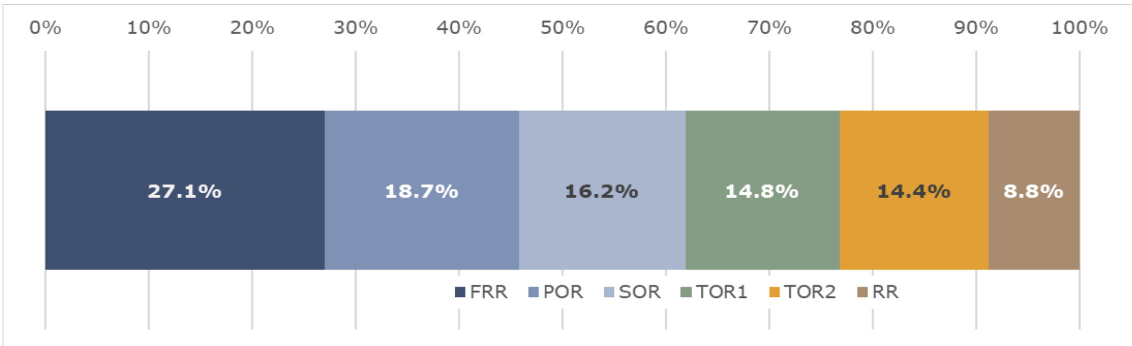

Figure 6: Reserve Availability per Service

According to the figure above, faster reserve products account for a larger portion of the Total Bid Price Cap allocated. This outcome is expected, as these products are anticipated to experience greater scarcity based on the projected generation portfolio in the near term. However, it is acknowledged that this situation may evolve as the generation portfolio changes, and the relative allocation across different services may need to be reassessed in the future. This approach also aligns with the findings of the DASSA Product Review and Locational Methodology Recommendations paper[22], which indicate that the system requires an increased volume of faster-responding products currently utilised in DS3 and Scheduling and Dispatch.

3. Ratio of Existing DS3 Tariff Rates
An alternative to the previously described methodologies is to consider the approach of maintaining the ratio currently applied for reserve payments under the DS3 Regulated Arrangements. The values for the split factors following this logic are shown in Table 9 below.

Table 9: DS3 Reserve Service Payments (EUR/MW)

Service	FFR	POR	SOR	TOR1	TOR2	RR (D)

[22] Section 3.2.2 (EirGrid); Section 3.2.2 (SONI)

Payment	1.94	2.92	1.76	1.40	1.12	0.56
Split factor	**20%**	**30%**	**18%**	**14%**	**12%**	**6%**

In summary, AFRY presents three options for distributing the Total Bid Price Cap across the six reserve products. The TSOs have a preference for the option based on 'Reserve Availability'. This approach is favoured over the others because it offers a more balanced allocation of the Total Bid Price Cap among the reserve products and meets the individual reserve price requirements of a synchronized CCGT to cover its opportunity costs across the three commodity price scenarios modelled by AFRY. However, in periods of high commodity prices, this may not be achieved. There may be merit in considering higher caps specifically for TOR2 and RR in the future.

4.2.5 Price Cap Value

4.2.5.1 Price Cap Value Proposal

The TSOs propose a Total Bid Price Cap of €500/MWh, applicable to both jurisdictions[23], to be allocated between the FFR to RR reserve services, for both upward and downward reserves. Guided by AFRY's analysis, the TSOs consider that the individual Bid Price Cap service values that best align with market needs correspond with the Reserve Availability approach, which offers a more balanced allocation of the total Bid Price Cap among the reserve products. The service values are set out in Table 10 below.

The TSOs acknowledge that the capacity mix differs between Ireland and Northern Ireland, particularly with respect to battery storage (see Section 3.4.4 of the AFRY report). In Northern Ireland, thermal generation is expected to play a more significant role in meeting reserve requirements, whereas in Ireland battery storage is anticipated to provide the predominant share, at least in the short term. The proposed Total Bid Price Cap value reflects the general consistency in the underlying costs of reserve provision between the two jurisdictions. As such, the proposed Total Bid Price Cap is considered suitable across both areas.

Since each DASSA Trading Period will be 30 minutes in duration, the figures below will be halved accordingly when applied.

Table 10: Proposed Bid Price Cap per Service

Service	FFR	POR	SOR	TOR1	TOR2	RR
Reserve Availability	135	94	81	74	72	44

4.2.5.2 Price Cap Revision

The proposed methodologies for setting the Bid Price Cap outlined in the sections above are informed by underlying cost data, including commodity prices. As such, these levels should be reviewed on a regular basis, particularly during periods of significant market cost fluctuations. AFRY proposes conducting an annual review to evaluate whether significant changes in generation costs and/or commodity prices warrant revising the Bid Price Cap values.

[23] Currency conversion will be applied to bidding and settlement as needed.

Based on operational experience, if market concentration is observed in a specific jurisdiction, it may be appropriate to apply the Total Bid Price Cap on a jurisdictional basis. Any such adjustment would be subject to industry engagement and a SEMC decision.

TSOs' Proposal:

DASSA Bid Price Cap per service per Trading Period to be implemented, applicable in both jurisdictions.

Total Bid Price Cap value of 500 EUR/MWh to be allocated across FFR to RR services, as follows (with Stg/MWh equivalents):

Service	FFR	POR	SOR	TOR1	TOR2	RR
Bid Price Cap	135	94	81	74	72	44

Annual revision of the Bid Price Cap to be conducted to reflect any significant changes to generation costs and/or commodity prices.

Question 2: Do you have any comments on the proposed DASSA Bid Price Cap design and value?

4.3 DASSA Price Floor

This section sets out the TSOs' proposal for the DASSA Price Floor.

4.3.1 Price Floor Proposal Overview

The TSOs propose a Bid Price Floor of €0/MWh in Ireland and £0/MWh in Northern Ireland per reserve service, upward and downward, per Trading Period to be implemented as part of the DASSA auction design.

4.3.2 Price Floor Context

While a DASSA Price Floor is not specifically mentioned in either the TSOs' DASSA recommendation paper[24] or SEM-24-066[25], the TSOs consider it appropriate that a price floor per service be consulted upon at this time.

4.3.3 Price Floor Global Overview

As noted in Section 4.2 above, AFRY conducted a review of some selected wholesale electricity and reserve markets. The analysis indicates that all those electricity markets surveyed have price floors in place. While those reserve markets examined do not have explicit floors, rather there is an implicit assumption that the floor is 0. For further details, please refer to Section 3.5 of AFRY's report.

4.3.4 Price Floor Design

4.3.4.1 Price Floor Design Methodology

In electricity markets, negative prices can occur due to several factors:

- Units with high start-up costs may bid negatively to avoid shutdown expenses,
- Supported RES can incorporate support payments in their bids, and
- Units may consider additional revenue streams such as heat revenues or ancillary services income.

However, a DASSA Order does not guarantee or give any priority for activation in the Balancing Market. If this was the case, service providers could attempt to adjust their offers in the DASSA to reflect such anticipated future income. As this is not the case, there does not appear to be an incentive to bid below zero in the DASSA.

Given the lack of incentive to bid negatively, AFRY's analysis focused on whether a positive Bid Price Floor could be justified. For a Bid Price Floor to be justifiable, there must be a minimum cost associated with providing reserve services. This cost can be either an actual or opportunity cost. In the context of energy limited units, any foregone income can be as low as zero, assuming flat or close to flat within-day prices and no energy arbitrage opportunities. For non-energy storage units, and CCGTs in particular, it is important to understand if there is a minimum level of cost of provision.

4.3.4.2 Price Floor Calculations

To assess the potential for a positive Bid Price Floor, AFRYs analysis considered the gap in marginality between synchronised CCGTs. This analysis suggests that the difference in foregone income can be

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[24] DASSA Design Recommendations Paper (EirGrid); DASSA Design Recommendations Paper (SONI)

[25] SEM-24-066 Future Arrangements for System Services DASSA Market Design Decision Paper (semcommittee.com)

as low as zero. This is expected in cases where some units have very similar short run marginal costs, but also in the case of the marginal electricity provider. Additional detail is provided in Section 3.5.2 of the AFRY report.

4.3.5 Price Floor Value

The TSOs propose a Bid Price Floor of €0/MWh for each reserve service for both upward and downward reserve, applicable to both jurisdictions (i.e. £0/MWh in Northern Ireland).

This proposal is supported by AFRY's analysis, which shows there are circumstances where the cost of provision and the potential foregone income from participating in the energy markets can be as low as zero.

TSOs' Proposal:
DASSA Bid Price Floor value of €0/MWh and £0/MWh for each individual reserve service.

Question 3: Do you have any comments on the proposed DASSA Bid Price Floor value?

4.4 DASSA Scarcity Price

This section sets out the TSOs' proposal for the DASSA Scarcity Price design and value.

4.4.1 Scarcity Price Proposal Summary

The TSOs propose that:

- A Scarcity Price in case of volume insufficiency will be applied across both jurisdictions per service per Trading Period.
- The Total Scarcity Price per hour will be defined as the maximum of the Total Bid Price Cap and the DAM price.
- The Scarcity Price value for each individual reserve product will be determined in accordance with the proportional allocation of the Total Bid Price Cap.
- A Volume Insufficiency Threshold, at which the scarcity price will apply, will be implemented for a given system service requirement, quality of service provision requirement and zone (jurisdiction) requirement, i.e. aligning with any volume requirements being treated as a constraint in the clearing of the DASSA. The TSOs propose that the value of the threshold for volume insufficiency will align with the volume that the TSOs will procure to cover the unavailability of reserve providers for any system service requirement / higher quality of service provision requirement / jurisdiction requirement combination, as per the TSOs' DASSA Volume Forecast Methodology Recommendations Paper[26]. Please see Section 7 below for further detail.

[26] Section 4.2 (EirGrid); Section 4.2 (SONI)

The TSOs note, however, that feeding the DAM price into the DASSA solution to dynamically update the scarcity price per product will be complex to implement and therefore may not be possible to deliver for DASSA go-live.

4.4.2 Scarcity Price Context

Volume insufficiency in the DASSA can occur when the reserve volumes offered in the daily auction fall below the minimum reserve volume requirements set by the TSOs, preventing the auction from clearing. While the TSOs do not expect this situation to occur under typical market conditions, its implications for system security are significant and pose unacceptable risk exposure for the TSOs.

To address this concern, a Scarcity Price mechanism has been integrated into the DASSA design. By providing appropriate price signals in secondary trading, the Scarcity Price is expected to encourage market participants to make additional capacity available, thereby strengthening overall system resilience and security during critical periods.

In our DASSA Design Recommendations Paper, the TSOs recommended that the DASSA design allow for the specification of a Scarcity Price per service in the event of volume insufficiency[27].

Subsequently, in SEM-24-066[28], the SEMC decided that the design of the DASSA allows for the specification of a Scarcity Price per service to address volume insufficiency in the DASSA. The Scarcity Price will apply to all completed DASSA Orders in instances of volume insufficiency for a service. SEM-24-066 also states that:

- The TSOs will address instances of volume insufficiency by procuring the volume deficit in secondary trading through issuing Sell Orders at a Secondary Trading Price of zero and assigning the DASSA Scarcity Price to the additional volumes procured in secondary trading.
- In the event of an oversubscription of volumes the TSOs will select matches based on, firstly, if the submitted buy orders are technically feasible, and secondly, on the basis of the value of the buy order starting at the highest submitted order.

4.4.3 Scarcity Price Design

4.4.3.1 Scarcity Price Design Approach

AFRY considered the following in developing its proposals for the DASSA Scarcity Price:

1. All DASSA Orders should receive the applied Scarcity Price to ensure consistency in the value offered to service providers awarded volumes in the daily auction, as well as to service providers purchasing Sell Orders placed by the TSOs in secondary trading. This harmonisation of the value encourages service providers to make their capacities available in the DASSA, minimising the risk of capacity withholding during periods of reserve scarcity.
2. The TSOs will not declare market scarcity or deploy scarcity pricing if any shortfall in reserve volumes procured in the daily auction is within a predetermined acceptable range that aligns with system security and operational needs, as per the Volume Insufficiency Threshold described in Section 7. The threshold would allow the TSOs to avoid declaring market scarcity for minor reserve shortfalls that do not significantly impact system security and operation, thereby preventing all available market volumes from being cleared at the Scarcity Price.

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[27] Section 3.6 & Section 3.10 (EirGrid); Section 3.6 & Section 3.10 (SONI)
[28] SEM-24-066: Section 2.8 (semcommittee.com)

3. The Scarcity Price will be defined based on the Total Bid Price Cap to allow the TSOs to signal appropriate prices in the DASSA and secondary trading markets, encouraging additional reserve capacity when DASSA bids do not fully reflect reserve scarcity. The Total Bid Price Cap will be set to enable the marginal service provider to recover opportunity costs or specific reserve provision costs, making it a sufficiently high offer during scarcity. However, in rare cases, DAM energy prices can exceed this cap, greatly widening the spread for units. Recognising the link between energy and reserve markets, the TSOs propose incorporating the DAM Clearing Price into the Scarcity Price formula to ensure reserve providers receive comparable returns across both markets.

Based on the above considerations, the TSOs propose the following:

1. A Volume Insufficiency Threshold shall be integrated in the DASSA design, providing an acceptable tolerance for volume insufficiency. Once market scarcity is declared by the TSOs, we will proceed to procure the necessary volumes through secondary trading to meet the minimum reserve requirements. The Volume Insufficiency Threshold for any product, service quality and zone combination will be in line with the level of unavailability considered in the Volume Forecast Methodology (VFM)[29], as described in Section 7 of this consultation paper.
2. When any procured volume shortfall exceeds the Volume Insufficiency Threshold, all offered volumes in the DASSA will be compensated at the Scarcity Price, in accordance with SEM-24-066[30]. The total Scarcity Price will be calculated using the following expression:

$$SP_{total} = \max(BC_{total}, DAM_{CP})$$

Where:

SP_{total} is the total Scarcity Price across all the upward or downward reserve products

BC_{total} represents the Total Bid Cap applied in the DASSA for all reserve products that provide response in the same direction (either upward or downward).

DAM_{CP} is the clearing price of the Day-Ahead Market (DAM) in the SEM.

The pricing for each individual reserve service during periods of scarcity will be determined in proportion to its contribution to the Total Bid Price Cap as outlined in the following expression.

$$SP_i = \frac{BC_i}{BC_{total}} \times SP_{total}$$

Where –

SP_i is the Scarcity Price for an individual reserve product, i
BC_i is the Bid Cap implemented in the DASSA for an individual reserve product, i.

Following this, the TSOs will engage in secondary trading by fulfilling unmatched Buy Orders or by submitting Sell Orders at a Secondary Trading Price of zero and assigning the Scarcity Price value to the procured volumes. It is anticipated that there may be more balancing capacity availability in secondary trading as service providers may gain improved visibility into their energy market schedules.

[29] Section 3.3.7 (EirGrid); Section 3.3.7 (SONI)
[30] SEM-24-066: Section 2.8 (semcommittee.com)

In line with SEM-24-066[31], in the event of an oversubscription of volumes in secondary trading, the TSOs will match their Sell Order based on, firstly, if the submitted Buy Orders are technically feasible, and secondly, on the basis of the value of the Buy Order starting at the highest submitted Order.

Worked examples can be found in Section 14.3 Appendix C below.

4.4.4 Scarcity Price Proposal

The TSOs propose:

- The Scarcity Price will be the maximum of the Total Bid Price Cap and the DAM price:
  $SP_{total} = \max(BC_{total}, DAM_{CP})$
- In the case that it is not possible to feed through the DAM price to the DASSA solution for DASSA go-live, the TSOs propose the Scarcity Price will be set to the Total Bid Price Cap.
- The Scarcity Price for each individual reserve service will be determined in accordance with their proportional contribution to the Total Bid Price Cap:
  $SP_i = \frac{BC_i}{BC_{total}} \times SP_{total}$
- A Volume Insufficiency Threshold, to serve as a tolerance applied to any shortfall in procured reserve volumes, will be in line with the level of unavailability considered in the Volume Forecast Methodology (VFM)[32] (see Section 7).

TSO's Proposal:

DASSA Scarcity Price per service per Trading Period to be implemented.

Subject to feasibility assessments in detailed design, total Scarcity Price to be determined as the maximum of the Total Bid Price Cap and the DAM price. Otherwise, the Scarcity Price will be set to the Total Bid Price Cap for DASSA go-live.

Scarcity Price per reserve product be determined based on their proportional contribution to the Total Bid Price Cap.

Volume Insufficiency Threshold to be implemented, above which the Scarcity Price will apply.

Question 4: Do you have any comments on the proposed DASSA Scarcity Price design and value determination?

[31] SEM-24-066: Section 2.8 (semcommittee.com)
[32] Section 3.3.7 (EirGrid); Section 3.3.7 (SONI)

5 DASSA Bidding

5.1 Introduction

This section sets out the TSOs' proposals for the following bidding-related components of the daily auction.

- Maximum number of P/Q pairs per service per Trading Period.
- Minimum step size in P/Q pairs for price
- Minimum step size in P/Q pairs for quantity.
- Daily auction gate window opening time.

There will be no change to the core DASSA bidding process as recommended by the TSOs and approved by the SEMC in SEM-24-066.

5.2 Max Number of P/Q Pairs per Service per Trading Period

5.2.1 Context

In our DASSA Design Consultation Paper[33], the TSOs proposed that a maximum number of price/quantity pairs that service providers may submit per service per Trading Period, which must be increasing, be implemented. The TSOs did not propose a value for this parameter.

5.2.2 Proposal

The TSOs propose that the maximum number of price/quantity pairs allowed per service per Trading Period in the daily auction will be 10, that is, a bid for a specific service and Trading Period can comprise up to 10 price/quantity pairs.

5.2.3 Rationale

The TSOs' proposal aligns with the 10 bid steps allowed for incremental bids (increasing net generation) and decremental bids (decreasing net generation) in the Balancing Market, i.e. in moving from an original FPN a service provider's output can cross no more than 10 real-time energy bid steps.

The standard DAM and intraday processes were developed to accommodate utility level portfolio bidding, so do not use bid steps, instead interpolating linear slopes between defined price/quantity points. As such, they are not easily comparable.

[33] Section 4.6 (EirGrid); Section 4.6 (SONI)

5.3 Min Step Size in P/Q Pairs - Price

5.3.1 Context

In the TSOs' DASSA Design Consultation Paper[34], the TSOs proposed that a minimum acceptable value for the price component of each bid step, which must be increasing, may be implemented. The TSOs did not propose a value for this parameter.

5.3.2 Proposal

The TSOs propose that the minimum step size for bid prices in the DASSA be the minimum non-zero positive price that can be expressed to 2 decimal places, which is €0.01/MW in Ireland and £0.01/MW in Northern Ireland. This is illustrated in Figure 7 below (red text).

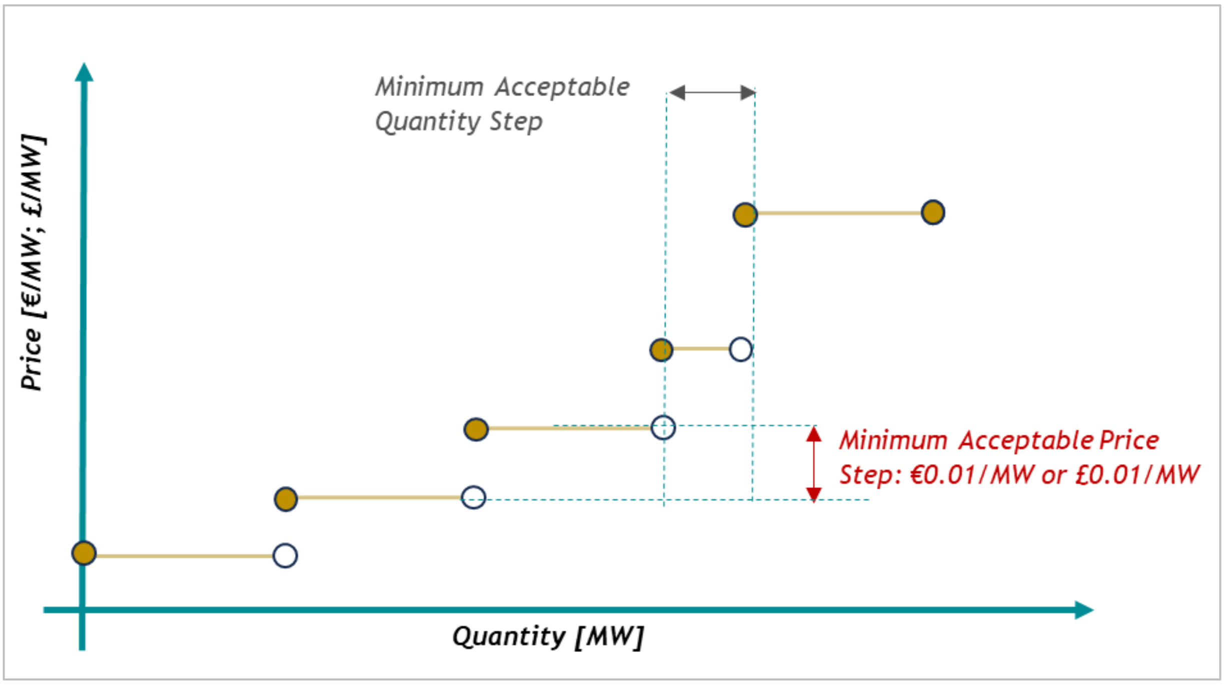

Figure 7: DASSA Bid Proposed Min Price Step Size

Note that the minimum step size only restricts the difference between prices of successive bids – it is unrelated to the value of the minimum bid price. For example, if the minimum bid price were to be zero, then a zero price could be submitted, but the next lowest bid price that could be submitted would be €0.01/MW in Ireland and £0.01/MW in Northern Ireland.

5.3.3 Rationale

The TSOs' proposal is consistent with practices in other SEM markets where €0.01/MW in Ireland and £0.01/MW in Northern Ireland is the minimum difference between successive bids, and the minimum resolution of a difference is 0.01 for each currency per MWh (Day Ahead Market and Balancing Market) or per MW (Capacity Market).

[34] Section 4.6 (EirGrid); Section 4.6 (SONI)

5.4 Min Step Size in P/Q Pairs - Quantity

5.4.1 Context

In the TSOs' DASSA Design Consultation Paper[35], the TSOs proposed that a minimum acceptable value for the quantity component of each bid step, which must be increasing, may be implemented. The TSOs did not propose a value for this parameter.

5.4.2 Proposal

The TSOs propose that the minimum step size for bid volumes in the DASSA will be 0.001 MW. This is illustrated in Figure 8 below (red text).

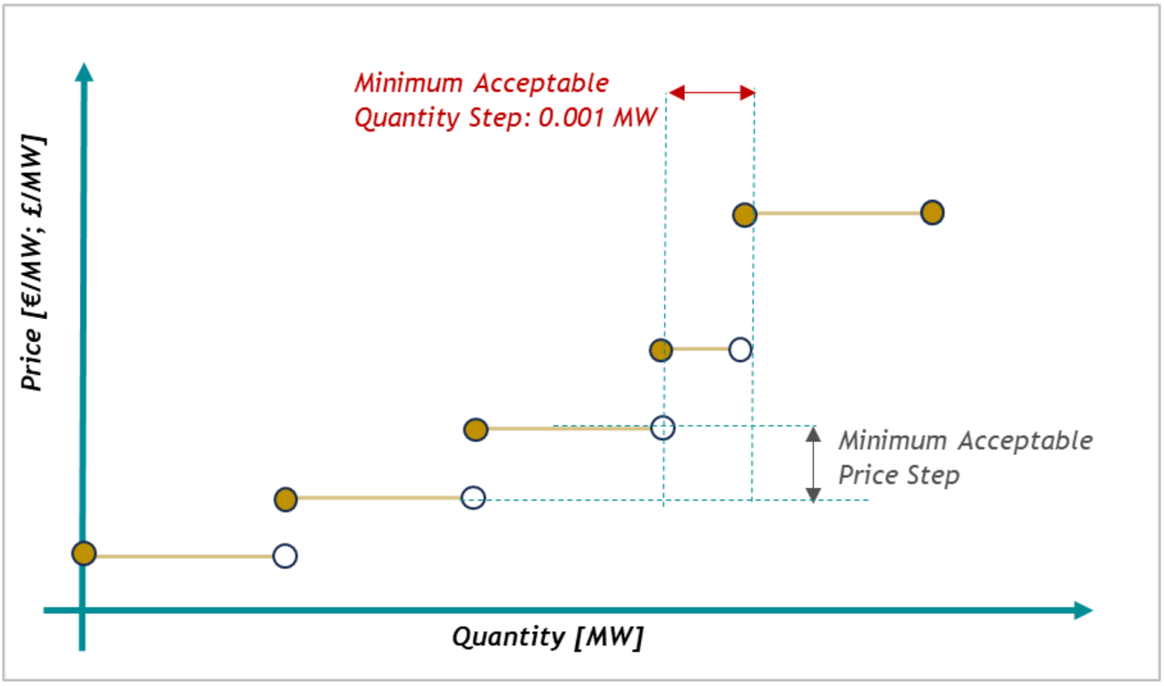

Figure 8: DASSA Bid Proposed Min Quantity Step Size

5.4.3 Rationale

This proposal is consistent with the Capacity Market limit of 0.001 MW, while the Trading and Settlement Code uses 0.001/MWh for energy bids. The DAM reports cleared results to only 0.1 MWh, though the bid format is more continuous in nature so less comparable.

Given only 10 bid steps are proposed to be submitted, the size of the bid increment should not materially impact the number of bids submitted.

[35] Section 4.6 (EirGrid); Section 4.6 (SONI)

TSOs' Proposal:

Service providers to be able to submit a bid for each individual service for each Trading Period within the Auction Timeframe, with bids to take the form of a stepwise linear supply function:

- Service providers may submit up to a maximum of 10 price/quantity pairs, which must be increasing.
- Minimum step size for bid prices in the DASSA will be €0.01/MW in Ireland and £0.01/MW in Northern Ireland.
- Minimum step size for bid volumes in the DASSA will be 0.001 MW.

Question 5: Do you agree with the TSOs' proposals for the maximum number of P/Q pairs and minimum step sizes in P/Q pairs for price and quantity?

5.5 Auction Gate Window Opening Time

5.5.1 Context

In the TSOs' DASSA Design Recommendations Paper[36], the TSOs recommended a DASSA gate closure time – the time of the execution of the daily auction - of 15:30 day ahead (D-1). This timing was subsequently confirmed by the SEMC in SEM-24-066. The TSOs did not propose a time for the opening of the bidding window for the DASSA.

5.5.2 Proposal

The TSOs propose that the gate opening time for the DASSA will be 11:45 AM day ahead (D-1) of the Auction Timeframe (23:00 D-1 to 23:00 D).

Figure 9 below illustrates the proposed timing of the DASSA gate window.

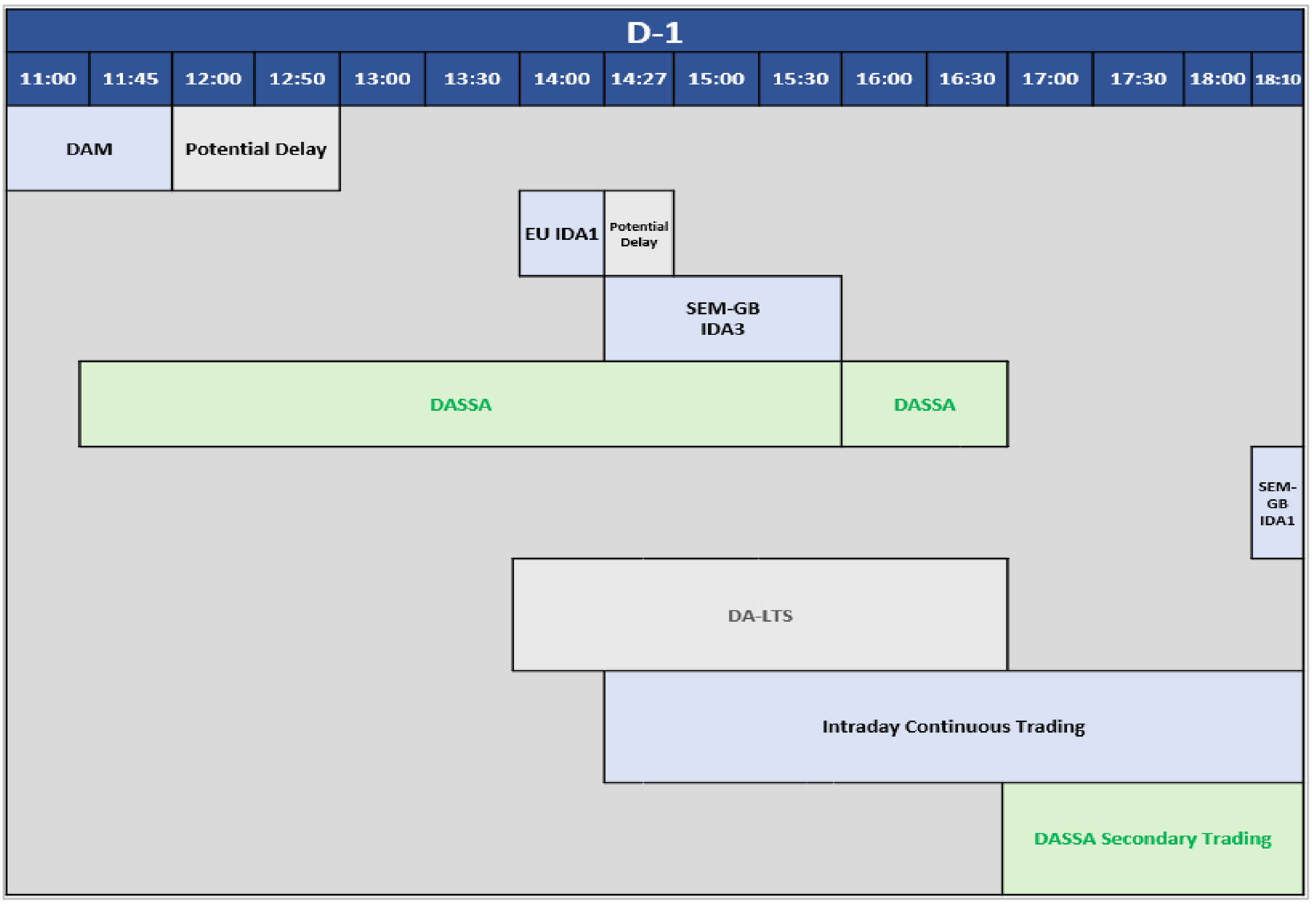

Figure 9: Proposed DASSA Bidding Window

5.5.3 Rationale

This proposed approach ensures that bidders have DAM information relative to which to form bids. With DASSA gate closure at 15:30 D-1, this gives bidders up to 3 hours and 45 minutes to submit bids.

A longer gate window would provide an opportunity to submit a bid at gate opening to ensure the service provider has a bid under any eventuality. However, the bid should be something that the

[36] Section 3.2 (EirGrid); Section 3.2 (SONI)

service provider can deliver on, which is dependent on its DAM position. Hence any default bid would not be valid following the DAM and would have to be replaced. By having the DASSA gate opening after the DAM, the risk of invalid bids is reduced.

TSOs' Proposal:

DASSA gate window to open at 11:45 D-1 and close at 15:30 D-1.

Question 6: Do you agree with the TSOs' proposal for the DASSA gate window opening time?

6 Secondary Trading Matching

6.1 Introduction

This section sets out the TSOs' proposals for the following DASSA secondary trading processes:

- Schedule for batch matching.
- Clearing and pricing in batch matching.

Proposals related to the participation of the TSOs in secondary trading to address instances of volume insufficiency are set out in Section 7 below.

Bilateral trading, which is permitted per SEM-24-066, is not in scope for this consultation as such trades will not be subject to the matching process.

The TSOs do not propose any mechanism for the settlement of secondary trades between buyers and sellers, i.e. the payment of the Secondary Trading Clearing Price per traded MW volume, in this consultation paper. The current design allows for such financial arrangements to be managed bilaterally between secondary trading parties. However, following feedback received from industry, the TSOs agreed to consider this matter further; it is still being deliberated upon, and an update will be provided to industry through appropriate channels in due course.

6.2 Schedule for Batch Matching

6.2.1 Context

Secondary Trading Buy and Sell Orders are defined as follows:

- Sell Order: A DASSA Order Holder wishes to transfer all or part of its Order and associated Commitment Obligation for a given service and Trading Period at a specified price - the price a potential buyer must pay the DASSA Order Holder for its DASSA Order. Each Sell Order must specify a single price and a single volume.
- Buy Order: A service provider wishes to obtain a DASSA Order for a given service and Trading Period at a specified price – the price the service provider is willing to pay a DASSA Order Holder for its DASSA Order. Each Buy Order must specify a single price and a single volume.

In the TSOs' DASSA Design Consultation Paper, the TSOs described two options for the matching of Buy and Sell Orders in secondary trading[37]:

1. First-come-first-served rolling matching: rolling matching of trades would be executed throughout the secondary trading window; if an Order could not be matched immediately, it would remain in the Order Book where it could be matched at a later stage, up to the secondary trading gate closure, i.e. one hour before the applicable Trading Period.
2. Batch matching: Buy and Sell Orders would be added to the Order Book during the secondary trading window and Orders would be matched in a batch after the secondary trading gate closure.

While noting the pros and cons of each option, the TSOs proposed option 1 as our preferred mechanism, primarily because service providers would have knowledge of the outcome of their trades earlier and have more time to adjust their position in advance of real time, if needed. A

[37] Section 5.4 (EirGrid); Section 5.4 (SONI)

majority of respondents to the consultation indicated a preference for option 1. In the TSOs' DASSA design recommendations paper, the TSOs therefore recommended first-come-first-served rolling matching of Buy and Sell Orders in secondary trading[38].

However, in SEM-24-066, the SEMC decided that the matching of Orders in secondary trading will be done on a batch matching basis[39]. The SEMC considered that batch matching would mitigate market power risks and enable greater participation by small market players, potentially increasing liquidity in the secondary market.

6.2.2 Proposal

The TSOs propose that the batch process to match secondary trading Buy and Sell Orders will be run every 30 minutes, immediately after the secondary trading gate closure for the Trading Period one hour hence.

Service providers participating in secondary trading may submit at most one price/quantity pair per service per Trading Period in any one batch, should they wish to buy or sell a DASSA Order.

The minimum volume for the Buy and Sell Orders in secondary trading will be 0.001 MW, aligning with the minimum step size for bid volumes in the DASSA.

As recommended in our DASSA Design Recommendation Paper[40], service providers will be able to specify relevant conditions associated with a Buy or Sell Order, such as Fill or Kill and Good Till. Buy and Sell Orders must indicate whether the secondary trading Order is non-divisible: if so, then the Buy or Sell Order must be traded in full or not at all.

The secondary trading gate window for an Auction Timeframe (23:00 D-1 to 23:00 D) will open immediately after the publication of the DASSA results, i.e. approximately 16:00 D-1. The batch will process all trades in the Order Book for all Trading Periods from one hour hence up to the final Trading Period for which the daily auction has executed. For example:

- The 11:00 batch will process Buy and Sell Orders for Trading Periods between 12:00 and 23:00 that day.
- The 18:30 batch will process Buy and Sell Orders for Trading Periods between 19:30 that day and 23:00 the following day.

6.2.3 Rationale

The secondary trading gate closure aligns with the Balancing Market gate closure 60 minutes ahead of the relevant Trading Period.

Noting that a DASSA Order Holder's compatibility to fulfil its Order will be evaluated at gate closure, service providers will not be able to manage the outcome of a secondary trade for the Trading Period one hour hence. This should encourage DASSA Order Holders to trade early, assuming any issues with the compatibility of their position is known well in advance.

[38] Section 4.5 (EirGrid); Section 4.5 (SONI)
[39] SEM-24-066: Section 3.5 (semcommittee.com)
[40] Section 4.3.4 (EirGrid) ; Section 4.3.4 (SONI)

6.3 Batch Matching Clearing and Pricing

6.3.1 Context

This section is concerned with the value of Secondary Trading Clearing Prices, i.e. the value of the Buy and Sell prices to apply to completed secondary trades in the Order Book as part of the batch matching process.

Secondary Trading Clearing Prices are not to be confused with the DASSA Clearing Price: for the avoidance of doubt, the DASSA Clearing Price will apply to all DASSA Orders, i.e. Order Holders will be paid the DASSA Clearing Price, irrespective of whether the Order was obtained in the daily auction or via secondary trading.

While the TSOs' DASSA Design Recommendations Paper set out various recommendations relating to secondary trading, the TSOs did not specifically recommend how the clearing prices for Buy and Sell Orders in secondary trading would be established. The SEMC did not make any decision on Secondary Trading Clearing Prices in SEM-24-066.

6.3.2 Proposals Overview

The TSOs propose two mechanisms for the establishment of Secondary Trading Clearing Prices:

1. Simple matching of Buy and Sell Orders.
2. Optimisation of Buy and Sell Orders.

Both options are described in the sections below.

For the reasons outlined below, the TSOs have a preference for the optimisation of offers. However, this option is significantly more complex than the TSOs' baseline design for secondary trading (Proposal 1) and therefore may not be feasible to implement for DASSA go-live. Additionally, the TSOs note that implementing first-come-first-served rolling matching for Secondary Trading at this stage would not be possible for DASSA go-live as it would require a substantial redesign effort of baseline IT requirements which were set following the publication of SEM-24-066.

6.3.3 Proposal 1 - Clearing the Secondary Trading based on Simple Matching

6.3.3.1 Proposal Description

Under this proposal, a Secondary Trading Price will be established for each individual matched trade.

The following conditions must be met for Buy and Sell Orders to be matched:

- There must be a Sell Order in the Order Book with a price that is less than or equal to the price of the Buy Order.
- The service quality of the Buy Order must be equal to or greater than the Sell Order service quality, i.e. secondary trades will be allowed between imperfectly substitutable service providers once lower quality service provision (static) does not replace higher quality service provision (dynamic) in the trade.
- The trade will not exceed the buyer's maximum qualified volume limit.
- The trade will not result in a breach of a DASSA constraint, such as a jurisdictional minimum volume requirement.

The TSOs propose that the Secondary Trading Clearing Price for each matched trade will be the value of the price of the Buy Order. This aligns with the TSOs' proposals for the procurement of any shortfall in services in instances of volume insufficiency (please see Section 7.2).

The TSOs propose two options for how secondary trades may be matched for a given system service and Trading Period:

- Option A: Starting with the highest Buy Order price matching with the lowest Sell Order price, and sequentially in order of decreasing Buy Order price, until there are no Sell or Buy Orders left that can be matched.

  The TSOs consider that this option will maximise the social welfare of each individual trade but may limit the quantity of trades.

- Option B: Starting with the lowest Buy Order price matching with the lowest Sell Order price, and sequentially in order of increasing Buy Order price, until there are no Sell or Buy Orders left that can be matched.

  The TSOs consider that this option will maximise the quantity of trades but may not result in the maximum social welfare being achieved for each trade.

The TSOs welcome feedback on both options.

6.3.3.2 Benefits and Challenges

The main benefit of matching trades individually is its simplicity, ensuring it is deliverable for DASSA go-live.

The downside of this proposal, however, is that it could reduce the economic efficiency of the matching of trades and negatively impact the bidding behaviour. In the absence of a general Secondary Trading Clearing Price, there will be a distortion in the incentives for units to bid according to their own perceived value of the trade and they must therefore be strategic in how they price their bids. This consequentially reduces the welfare gains from trading. Furthermore, when non-divisible bids are present in the order book, this matching will not necessarily match all trades efficiently, which further reduces the potential welfare gains from trading.

Options A and B above involve a trade-off between economic efficiency and the overall volume of trades. Matching the highest Buy Order price with the lowest Sell Order price may improve economic efficiency by adhering to the merit order. However, this approach could reduce the volume of trades, thereby limiting overall trade gains. Conversely, matching the lowest Buy Order price with the lowest Sell Order price may maximise the volume of trades, but this comes at the expense of economic efficiency as it disregards the merit order.

6.3.4 Proposal 2 – Clearing the Secondary Trading based on Optimisation

6.3.4.1 Proposal Overview

Under this proposal, each batch in secondary trading will be cleared by solving an optimisation problem that will determine a Secondary Trading Clearing Price for buyers and sellers to be applicable to all secondary trades for a given system service and Trading Period. In certain circumstances, two separate Secondary Trading Clearing Prices will be determined - one for Sell Orders and one for Buy Orders.

6.3.4.2 Optimisation Objective Function

The aim of the secondary trading optimisation problem will be to maximise the overall social welfare, i.e. the total benefit available to the buyers and sellers in secondary trading. The social welfare is the value that buyers get from their purchase less the costs that sellers are willing to obtain from the trade. At a high level, and excluding consideration of non-divisible bids, this is illustrated in Figure 10 below.

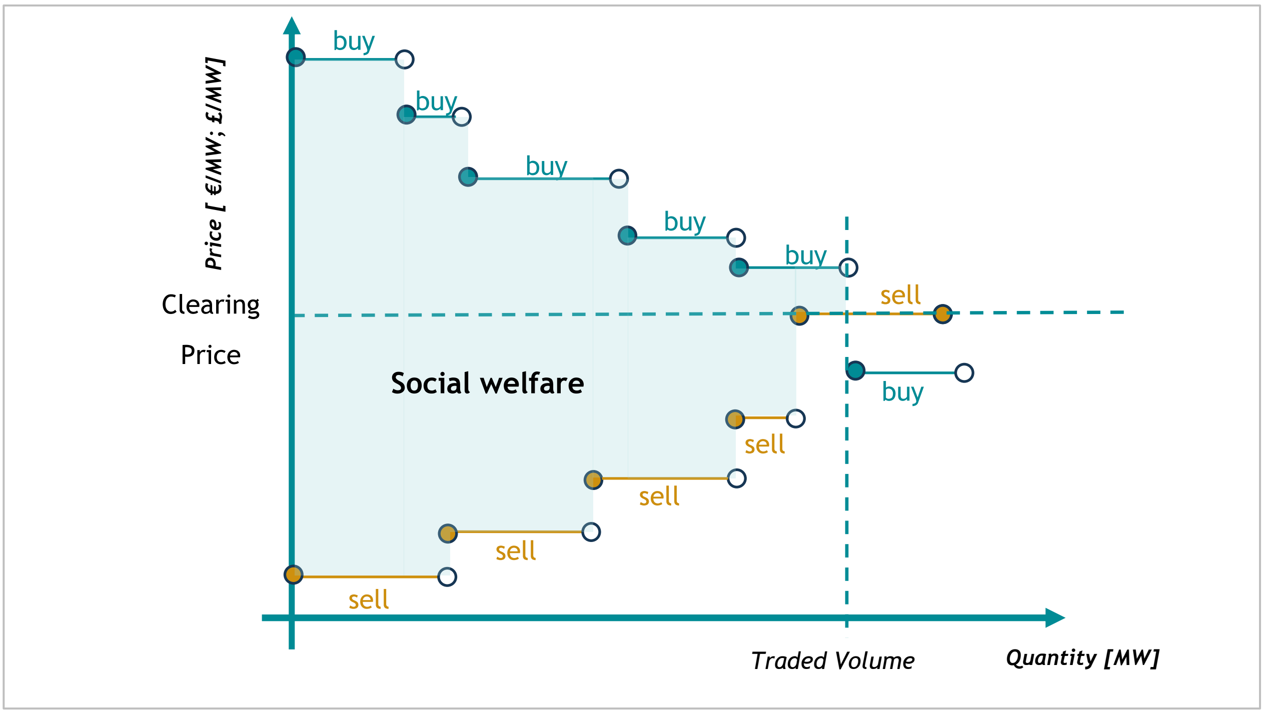

Figure 10: Secondary Trading Optimisation Social Welfare

In simple terms, the optimisation will lead to the selection of the buyers and sellers based on the following criteria:

- The buyers who value the given system service the most, i.e. are willing to pay the highest price to obtain a DASSA Order.
- The sellers who are seeking the lowest price to offload their DASSA Order.

6.3.4.3 Optimisation Constraints

The optimisation will be subject to a volume balance constraint for each system service and service quality combination: this volume balance constraint ensures that the total volume cleared on the buyer side is equal to the total volume cleared on the seller side.

The principle of allowing secondary trading between imperfectly substitutable service providers will be maintained, i.e. Sell Orders of lower quality service provision may be matched with Buy Orders of higher quality service provision, providing that there is sufficient volume from higher quality service provision.

The optimisation process must not result in a breach of a DASSA constraint, such as a jurisdictional minimum service volume requirement.

6.3.4.4 Optimisation Pricing - Divisible Bids

In establishing a Secondary Trading Clearing Price, the optimisation process will need to account for both divisible and non-divisible bids.

In the absence of non-divisible bids, the Secondary Trading Clearing Price would be determined by the marginal partially accepted Buy or Sell Order, as per Figure 10 above. All Buy Orders priced above the Secondary Trading Clearing Price and all Sell Orders priced below the Secondary Trading Clearing Price would be cleared, i.e. all such secondary trading orders will be in merit. In general, where a merit order applies, the Secondary Trading Clearing Price can be set by either the highest accepted Sell Order price or the lowest accepted Buy Order price.

6.3.4.5 Optimisation Pricing - Non-Divisible Bids

The presence of non-divisible orders in secondary trading would add complexity to the optimisation and establishment of a Secondary Trading Clearing Price. This is because if the marginal order is a non-divisible order, the algorithm cannot divide the order to accept only the portion that would be in merit in order to maintain the volume balance between the Buy and Sell sides. In such cases, the outcomes of the secondary trading clearing optimisation would not align with a simple merit order-based pricing mechanism, i.e. where Buy Orders greater than or equal to a certain price are accepted, Sell Orders lower than or equal to the Secondary Trading Clearing Price are accepted, with all other orders rejected.

6.3.4.6 Optimisation Pricing Proposal

As noted above, non-divisible orders can give rise to situations where the maximisation of social welfare does not necessarily result in all accepted orders being strictly in merit. To address these issues, the TSOs propose a hybrid mechanism for the optimisation of the Secondary Trading Clearing Price. Four scenarios and their proposed mechanisms are described below:

A. Where all orders are divisible, then the Secondary Trading Clearing Price will be determined by the marginal partially accepted Buy or Sell Order (as per Figure 10 above). See worked example 1 in Appendix A below.

B. Where there are non-divisible bids, the Secondary Trading Clearing Price may still be determined by the marginal partially accepted Buy or Sell Order if that order is divisible. See worked example 2 in Appendix A below.

C. Where there are non-divisible orders present AND the highest accepted Sell Order has a lower price than the lowest accepted Buy Order, this will define a potential range for the Secondary Trading Clearing Price. Within this range, the Secondary Trading Clearing Price will be selected to be as close as possible to the marginally accepted order (whether Buy or Sell). See worked example 4 in Appendix A below.

D. Where there are non-divisible orders present AND the lowest accepted Buy Order is lower than the highest accepted Sell Order, it will not be possible to establish a Secondary Trading Clearing Price for all accepted orders that will balance payments and monies payable. In this case, separate Secondary Trading Clearing Prices for Buy and Sell Orders will be allowable: orders will be settled at the relevant Buy / Sell Secondary Trading Clearing Price unless they would be out of merit at that price, in which case they would be settled as pay-as-bid. The Sell and Buy Secondary Trading Clearing Prices chosen will be the combination closest to the conventional marginal price. See worked example 3 in Appendix A below.

6.3.4.7 Benefits and Challenges

Optimising the clearing of secondary trading offers several key benefits:

- Ensures economic efficiency in secondary trades, maximising gains for participants.
- Preserves bidding behaviours, preventing distortions caused by inefficiencies in the clearing process.

The challenge with the optimisation of secondary trading clearing is that it will increase the complexity of the DASSA solution. Due to this additional complexity, the TSOs may need to increase resourcing or divert key personnel from other in-flight programmes. Depending on the final design, the TSOs will need to consider resource availability and technical feasibility with external vendors ahead of confirming the delivery timelines. Therefore, this option may not be deliverable by DASSA go-live.

TSOs' Proposal:

Matching of Buy and Sell Orders in secondary trading to be processed on a batch-matching basis:

- Batch matching to be scheduled every 30 mins, at secondary trading gate closure.
- Proposals for the establishment of the prices in secondary trading are:
    - Simple matching, with two sub options:
        1. Starting with the highest Buy Order price matching with the lowest Sell Order price
        2. Starting with the lowest Buy Order price matching with the lowest Sell Order price
    - Optimisation of trades to obtain a Secondary Trading Clearing Price (TSOs' preferred option)

Question 7: Do you have any comments on the TSOs' proposals for the batch matching of Buy and Sell Orders and the determination of prices in secondary trading?

7 Volume Insufficiency

7.1 Introduction

This section sets out the TSOs' proposal for the value of the DASSA volume insufficiency threshold, at which an instance of volume insufficiency is deemed to have occurred and the TSOs will enter secondary trading to procure any shortfall arising from the daily auction at the Scarcity Price.

The TSOs' proposal regarding the Scarcity Price is set out in Section 4.4 above.

7.2 Volume Insufficiency Threshold

7.2.1 Context

In the TSOs' DASSA Design Recommendations Paper, the TSOs recommended that the measure to address instances of volume insufficiency – whereby a specified service volume has not been fully procured in the daily auction - would be for the TSOs to procure the volume deficit in secondary trading at the DASSA Scarcity Price[41]. In practice, this would mean that the TSOs would enter secondary trading with Sell Orders at a Secondary Trading Price of zero, with the DASSA Scarcity Price to apply to the volumes procured by the TSOs in secondary trading.

In SEM-24-066[42], the SEMC approved the TSOs' recommended mechanism, while also deciding that:

- The Scarcity Price will apply to all completed DASSA Orders in instances of volume insufficiency.
- In the event of an oversubscription of volumes, the TSOs will select matches based on, firstly, if the submitted Buy Orders are technically feasible, and secondly depending on the options outlined in sections 6.3.3 and 6.3.4 for clearing the secondary trading:
    - Using Simple Matching: In this case, Buy Orders will be matched with the TSOs' Sell Order in descending order of price starting with the highest Buy Order (as per Option A in Section 6.3.3 above).
    - Using Optimisation: In this case, Buy Orders will be matched with the TSOs' Sell Order, based on the optimisation process described in Section 6.3.4.

7.2.2 Proposal

The TSOs propose that any instance of volume insufficiency will apply to a given system service total requirement, higher quality of service provision (dynamic) requirement and zone (jurisdiction) requirement, i.e. aligning with any volume requirements being treated as a constraint in the clearing of the DASSA.

The TSOs propose that the value of the threshold for volume insufficiency will align with the volume that the TSOs will procure to cover the unavailability of reserve providers for any system service requirement / higher quality of service provision requirement / jurisdiction requirement combination, as per the TSOs' DASSA Volume Forecast Methodology Recommendations Paper[43]. While example values have been outlined in the Volume Forecast Methodology consultation and

[41] Section 3.10 (EirGrid); Section 3.10 (SONI)
[42] SEM-24-066: Section 2.8 (semcommittee.com)
[43] Section 4.2 (EirGrid); Section 4.2 (SONI)

recommendation papers, the actual threshold values will be published as part of the annual Y-1 forecast. If it becomes necessary to adjust the threshold for operational reasons within a given year, the TSOs will provide details of the change, along with the rationale, in the weekly forecast updates.

In instances of volume insufficiency for a given Trading Period, the only Sell Orders that will be matched in a batch will be TSO Sell Orders i.e. if there are TSO Sell Orders in a batch for a given system service requirement, higher quality of service provision (dynamic) requirement and zone (jurisdiction) requirement, then no other Sell Orders will be processed in that batch for the same shortfall. Once the shortfall in volumes has been procured by the TSOs in secondary trading, Sell Orders placed by service providers for the same Trading Period may then be matched in subsequent batches.

In instances of volume insufficiency for a given Trading Period, where there is a TSO Sell Order in a batch, bilateral trading will not be permitted for a given system service, higher quality of service provision (dynamic) and zone (jurisdiction) i.e. the bilateral trade will not be validated by the TSOs during an instance of volume insufficiency.

The TSOs consider that the following concerns will need to be addressed in the finalised design:

- That service providers are incentivised to participate in secondary trading when the TSOs submit Sell Orders in instances of volume insufficiency.
- That sellers cannot exercise market power in secondary trading in subsequent batches after the instance of volume insufficiency has been resolved. The TSOs have recommended that the RAs consider the development and implementation of a BCOP specifically for the system services market.

The establishment of the Secondary Trading Clearing Price in instances of volume insufficiency will be as per the proposals set out in Section 6 above.

For example (values are illustrative only):

- The DASSA volume requirement for dynamic POR in Northern Ireland for a given Trading Period is 300 MW.
- The DASSA clears for 210 MW dynamic POR in Northern Ireland for the Trading Period.
- All other reserve service volume requirements and constraints are met in the DASSA for the Trading Period.
- An instance of volume insufficiency occurs for dynamic POR in Northern Ireland for the Trading Period, as the shortfall of 90 MW is greater than the threshold of 75 MW (for this example).
- The Scarcity Price applies to all DASSA Orders for dynamic POR in Northern Ireland for the Trading Period. The DASSA Clearing Price applies to all other procured service volumes.
- The TSOs enter secondary trading to procure 90 MW of dynamic POR in Northern Ireland for the Trading Period at a secondary trading Sell price of zero. No other Sell Orders will be processed in that batch.
- The Secondary Trading Clearing Price will be as per the proposals set out in Section 6 above.

Detailed worked examples can be found in Section 14.2 Appendix B below.

7.2.3 Rationale

The TSOs consider that it would be appropriate to enter the secondary trading market and initiate scarcity pricing if an insufficiency arises in the volume cleared in the DASSA for a particular service, and recognise that a balance between appropriate market signalling, economic efficiency, frequency of TSO trading and volume insufficiency needs to be found.

The TSOs therefore propose that secondary trading should be triggered when there is an insufficiency equal to or greater than the volume procured to cover the unavailability of reserve providers. The DASSA Volume Forecast Methodology Recommendations paper outlines the rationale for the requirement of this volume[44]: to ensure sufficient procurement of reserves in the day-ahead auction to meet real time need. The TSOs also consider that operational experience of both the DASSA auctions, the secondary trading processes and any top-up mechanism will be important to allow finetuning of any volume insufficiency trigger for the TSOs to enter secondary trading and for the Scarcity Price to apply. Therefore, the TSOs reserve the right to enact changes to this value to ensure operational certainty and security.

The TSOs also consider that the procurement of volume shortfalls in secondary trading based on the merit order of submitted Buy Orders will act as a disincentive for service providers to withhold capacity in the DASSA in expectation of receiving a higher price in secondary trading.

TSOs' Proposal:

Threshold for volume insufficiency to align with the volume that the TSOs will procure to cover the unavailability of reserve providers, for any system service / higher quality / jurisdiction requirement.

Value of the threshold to be subject to review, with any proposed change to be subject to appropriate industry engagement.

Question 8: Do you agree with the TSOs' proposal for establishing the value of the threshold for an instance of volume insufficiency?

[44] Section 4.2 (EirGrid); Section 4.2 (SONI)

8 Commitment Obligations & Incentives

8.1 Introduction

An essential feature of a DASSA Order is that it will include a Commitment Obligation to provide the awarded service for the specified Trading Period, i.e. the DASSA Order Holder will be required to be available to provide the service and to deliver it when called upon to do so.

This section sets out the TSOs' proposals for the following DASSA Order incentives:

- Pre-gate closure: value and application of a Compensation Payment.
- Post-gate closure: service availability and service delivery incentives.

The TSOs do not propose a value for the frequency trigger to apply to performance monitoring in the DASSA in this consultation paper, nor any mechanism relating to 'data poor' - instances of service providers not demonstrating capability to provide services due to the absence of responses to frequency events over a defined period. These matters are still under consideration with the TSOs.

8.2 Context: TSOs' Recommendations and SEMC Decisions

8.2.1 TSOs Recommendations for Commitment Obligations and Incentives

In our DASSA Design Recommendation paper[45], the TSOs recommended that the process to incentivise a DASSA Order Holder to fulfil its obligation would comprise two key elements:

1. At gate closure, one hour before the applicable Trading Period, a requirement for the Order Holder to have confirmed its DASSA Order through the submission of a compatible FPN. Otherwise, the Order would be deemed fully or partially lapsed, in which case the Order Holder would not receive a DASSA payment for the portion of the Order that lapsed and would be required to pay the TSOs a Compensation payment (proportionate to the portion of the Order that lapsed). Allowances would be made for Orders that lapsed due to TSO actions, resulting in scaled / partial DASSA payments and dispensation of the Compensation Payment in certain circumstances. The TSOs did not recommend a value for the Compensation Payment, noting that it was subject to future industry consultation (which is the purpose of this section of the consultation paper).
2. In real-time, a performance scalar regime will be applied to incentivise a confirmed DASSA Order Holder. This regime is designed to ensure the Order Holder is available to provide the applicable service volume (Availability Performance Scalar) and capable of delivering the service when called upon (Event Performance Scalar). The TSOs did not recommend a detailed scalar design or specific scalar values but noted that this would be subject to a future industry consultation (which is the purpose of this section of the consultation paper).

8.2.2 SEMC Decisions on Commitment Obligations and Incentives

In SEM-24-066, the SEMC[46]:

[45] Section 5.2 (EirGrid); Section 5.2 (SONI)
[46] SEM-24-066: Section 4 (semcommittee.com)

- Reserved its decision on the application of the Compensation Payment within the Commitment Obligation structure until the TSOs concluded their consultation on the value of the Compensation Payment.
- Decided that all DASSA Order Holders which are unable to meet their Commitment Obligation at gate closure, regardless of the reason for same, will not be eligible to receive a DASSA payment, partial or otherwise.
- Directed the TSOs to consult on real-time incentive options, including performance scalars and maintaining the Commitment Obligation framework up to real time.

8.3 Overview of Performance Incentives in Other Markets

Our partner AFRY has examined the performance incentives in other European markets to understand the approach adopted to incentivise high-quality service provision by different service providers. Despite fundamental design differences between the DASSA and other system services markets, particularly in product definitions, the review focused on markets that procure system services at the day-ahead stage through competitive auctions.

An overview of availability and performance incentives in other markets can be seen in Table 11 below.

Table 11: Incentives in Other Markets

Market	Availability incentives	Performance Incentives
mFRR and RR in France	• Marginal price of Balancing Capacity and spot price in the energy market	• Marginal price of Balancing Capacity and spot price in the energy market
aFRR and FRR services in Belgium	• Based on lapsed volumes and reserve capacity price • Time period considered – 30 days	• Based on share of under delivered response and remuneration for the reserve capacity • Time period considered – 1 week
Dynamic Regulation in the UK	• Scalar based incentive • Binary (0 or 1) scalar to the service payment	• Scalar based incentive
aFRR in Finland	• Lapsed volumes do not receive any remuneration • Sanctions are applied on the basis of lapsed volumes of reserve capacity	• Temporary and permanent exclusion if the performance does not adhere to the required standards
mFRR in Finland	• Same as in the case of aFFR • Addition of an adjustment scalar	

This review highlights the varied approaches to incentivising availability and performance in different markets, providing valuable insights for the DASSA design. Most markets use incentives to encourage delivery of contracted services, ensuring providers remain available, and deliver high-quality responses. Please refer to Section 4.1 of the AFRY report for further information.

8.4 Overview of TSOs' Commitment Obligations & Incentives Proposal

This section sets out the TSOs' end-to-end Commitment Obligation & Incentive proposals. The detail of each proposed component of the process is described in the sections below.

Our proposals build upon our DASSA design recommendations and take account of the SEMC decisions in SEM-24-066[47].

8.4.1 Proposal Summary

A fundamental aspect of the TSOs' proposed design is to ensure that service providers are motivated to meet their obligations. This includes fulfilling their DASSA Order, accurately declaring their availability, and responding promptly when required, whether automatically due to a frequency event or following a dispatch instruction.

The proposed incentive structure for DASSA Orders is summarised in Table 12 below.

Table 12: Proposed Incentive Structure

Pre-Gate Closure Incentives		
Incentive	**Which volumes are impacted?**	**What is the incentive?**
Compensation Payment	• Self-lapsed DASSA Order • Submission of incompatible FPN • Exemptions[1]: 1) Lapsed orders as a result of TSO actions; 2) DASSA Orders for the Trading Periods falling within the Grace Period, post a response delivery by the unit	• DASSA payments for the lapsed volumes are forfeit and the service providers have to pay a Compensation Payment in respect of the lapsed volumes • The Compensation Payment[2], as proposed, is to be calculated as the difference between the adjusted DASSA price and the DASSA Clearing Price. • In the proposed approach, the 'adjusted' DASSA price is the theoretical clearing price excluding the DASSA Orders that were eventually lapsed.
Objective / Rationale:		
• Incentivise service providers to make DASSA Order volumes available by submitting a compatible FPN or find replacement volumes in the secondary market. The Compensation Payment is an estimate of the counterfactual cost faced by the TSOs.		

[47] SEM-24-066 Future Arrangements for System Services DASSA Market Design Decision Paper (semcommittee.com)

Post-Gate Closure - Service- Availability Incentives		
Incentive	**Which volumes are impacted?**	**What is the incentive?**
Availability Performance Scalar **&** **Compensation Payment**	• Unavailable confirmed DASSA Order volumes • Exemptions[1]: 1) Unavailable confirmed DASSA Order volumes as a result of TSO actions; 2) Confirmed DASSA Orders for the Trading Periods falling within the Grace Period, post a response delivery by the unit	• DASSA payments for the unavailable volumes are forfeit and the service providers have to pay a Compensation Payment[2] for the concerned Trading Periods. • Reduced DASSA settlement payments, with the application of the scalar ranging between 0 and 1. The value of the scalar depends on the weighted average monthly performance of the unit and impacts payments for all the Trading Periods in the months falling in the persistence duration of the scalar.
Objective / Rationale:		
• Incentive to maintain availability for the contracted volumes. • Post Gate Closure incentive for volume availability is stronger than the pre-Gate Closure incentive. This is to maintain a hierarchy and avoid situations where providers can arbitrage between 'lapsing' and post Gate Closure unavailability.		

Post-Gate Closure - Service Delivery Incentives		
Incentive	**Which volumes are impacted?**	**What is the incentive?**
Event Performance Scalar	• Failure to respond and deliver the volumes cleared in the DASSA and made available by the unit • This may also extend to the RAD[3] should this be eventually adopted	• Reduced DASSA settlement payments, with the application of the scalar ranging between 0 and 1 in value. • Reduced RAD[3] (should the RAD be adopted) settlement payments, with the application of the scalar ranging between 0 and 1 in value. • The value of the scalar depends on the monthly performance of the unit and impacts payments for all the Trading Periods in the months falling in the persistence duration of the scalar.
Objective / Rationale:		
• Incentivise delivery of a service in response to a frequency event or a dispatch instruction, when available to do so. • The scalar has been structured to provide strong incentives to perform in most circumstances.		

Notes: (1) For all the exemptions noted in the table above, the suspension of DASSA payment will continue to apply, in line with the SEMC's decision paper[48] (SEM-24-066); (2) The proposed approach for determining the Compensation Payment as the difference between the adjusted DASSA price and the DASSA Clearing Price is the TSOs' preferred option among the approaches considered. It remains subject to change pending the outcome of industry consultation and the subsequent SEMC's decision; (3) Residual Availability Determination (RAD) is the proposed DASSA top-up mechanism option by the TSOs. However, the option and the structure of the DASSA top-up mechanism remains subject to change pending the outcome of industry consultation and the subsequent SEMC's decision.

8.4.2 Pre-gate Closure

At gate closure, one hour before the applicable Trading Period, a DASSA Order Holder must confirm its DASSA Order through the submission of a compatible FPN, i.e. for the Order Holder to confirm that its Order is compatible with its ex-ante energy market position and that it therefore has available headroom (or footroom) to provide the service. Otherwise, the Order will be deemed fully or partially lapsed, in which case the Order Holder will not receive a DASSA payment for the portion of the Order that lapsed and will be required to pay the TSOs a Compensation Payment (proportionate to the portion of the Order that lapsed). The TSOs propose that allowances will be

[48] SEM-24-066: Section 4.1 (semcommittee.com)

made for Orders that lapsed due to TSO actions, resulting in the waiving of the Compensation Payment in certain circumstances.

The TSOs acknowledge that not all technology types submit FPNs and propose that alternative arrangements be implemented to allow all qualified units to participate in the DASSA. A TSO-deemed FPN will apply to interconnectors. For service providers that do not submit FPNs, such as priority dispatch renewable units, their DASSA Order will be automatically confirmed at gate closure and any contracted balancing capacity must be excluded from their ex-ante trading position. These non-dispatchable providers will then have their orders evaluated for availability post-gate closure. Battery FPNs, for which compatibility cannot be definitively verified based on the information available by gate closure will, where appropriate, be deemed compatible.

An overview of the TSOs' pre-gate closure Commitment Obligations & Incentives proposal is described below in Figure 11.

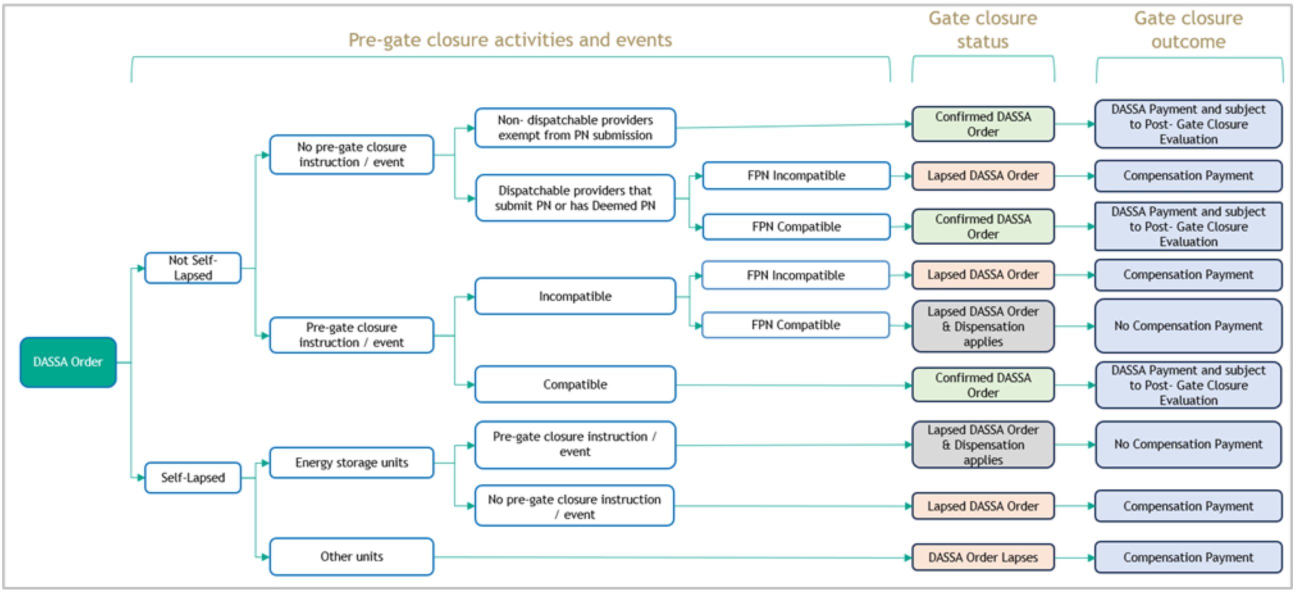

Figure 11: Pre-gate Closure Commitment Obligations & Incentives Proposal

If a DASSA Order Holder knows that it will not be able to fulfil its obligation, it should engage in secondary trading to sell the DASSA Order.

8.4.3 Post-gate Closure

In real-time, holders of Confirmed DASSA Orders must make themselves available, and make the applicable availability declarations to the TSOs, for the service volume contained in the Order. The TSOs propose that post-gate closure availability incentives will motivate this required behaviour.

Holders of Confirmed DASSA Orders, who have an obligation to make themselves available, must deliver the service when called upon to do so, either in response to a frequency event or TSO dispatch instruction. The TSOs propose an Event Performance Scalar to incentivise this behaviour.

The post gate closure commitment obligation framework ensures that service providers maintain availability and deliver expected responses for contracted volumes. If no post gate closure instructions or events occur, Order Holders must remain available and deliver the expected service to receive full payment. If Order Holders are unavailable, a Compensation Payment will be applied according to availability performance metrics, together with scaled down DASSA payments via an

Availability Performance Scalar. Failure to deliver a service will result in scaled-down DASSA payments, based on a performance evaluation, via an Event Performance Scalar.

The TSOs propose that allowances will be made for DASSA Order Holders that are unavailable to fulfil their Order due to TSO actions or events.

An overview of the TSOs' real-time incentive process is described Figure 12 below.

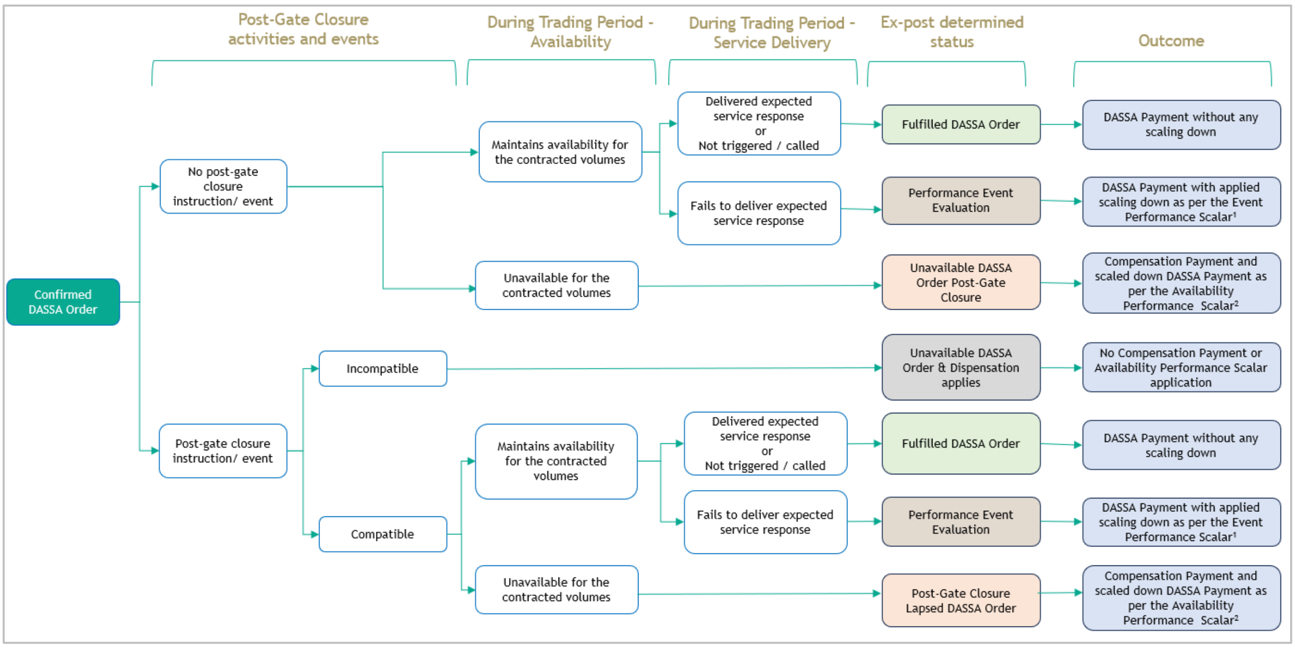

Figure 12: Post-gate Closure Commitment Obligations & Incentives Proposal

Note: (1) The Event Performance Scalar applies to the monthly DASSA and RAD settlement payments of the current and subsequent months, as proposed in the consultation paper. (2) The Availability Performance Scalar applies to the monthly DASSA settlement payments of the current and subsequent months, as proposed in the consultation paper.

8.5 Hierarchy of Commitment Obligation and Scalars

This section describes the hierarchy of incentives within our proposed end-to-end design.

8.5.1 Pre-gate Closure and Post-gate Closure Availability Incentives

In our DASSA Design Recommendations Paper[49], the TSOs recommended that the Compensation Payment apply to lapsed DASSA Orders up to gate closure, while an Availability Performance Scalar would become effective on confirmed DASSA Orders post gate closure.

From the perspective of system operation, the TSOs have a preference for service providers to lapse their DASSA Orders rather than be unavailable in real-time. To reflect this in the incentives, the impact of the Availability Performance Scalar should be greater than that of the Compensation Payment.

This proposed hierarchy aims to address a situation in which service providers may have a resulting incentive to submit a compatible FPN, even if they anticipate upcoming unavailability. The Compensation Payment is designed to incentivise secondary trading over the lapsing of DASSA Orders. The post-gate closure availability incentives must exceed the Compensation Payment to encourage

[49] Section 5 (EirGrid); Section 5 (SONI)

accurate declaration of a service provider's availability at gate closure and ensure accurate ex-ante visibility of available reserves.

AFRY's analysis indicates that establishing a consistently binding hierarchy where the Availability Performance Scalar outweighs the Compensation Payment is quite challenging, as it would require the scalar to be excessively punitive and highly sensitive to minor deviations from the required availability performance. Regardless of the Compensation Payment designs considered in Section 0 below, situations arise where arbitrage between the incentive mechanisms is possible. For instance, a service provider frequently clearing the DASSA might find the Compensation Payment too punitive compared to the Availability Performance Scalar when the unit is unavailable for only a few Trading Periods. In such cases, the service provider is incentivised to face the Availability Performance Scalar rather than report unavailability at gate closure. To address this, AFRY recommends implementing an explicit connection between the two design elements rather than an implicit hierarchy. This approach ensures a simpler and more effective solution that remains binding under all situations, avoiding overly punitive and sensitive incentive structures for deviations from the required availability performance.

Considering the above, the TSOs have revised the approach that we outlined in our DASSA Design Recommendations paper[50] and now propose that the Compensation Payment remain applicable even after gate closure, alongside the Availability Performance Scalar. This ensures the necessary hierarchy between incentives for pre-gate closure Order confirmation and post gate closure availability is consistently maintained. Our proposal is therefore to extend the applicability of the commitment obligation framework to post-gate closure on unavailable contracted volumes, i.e., the application of the Compensation Payment and suspension of the DASSA payment for any unavailable volumes.

This design change aligns the Compensation Payment with its principle of reflecting the cost borne by the TSOs in procuring alternative reserve volumes. If a confirmed DASSA Order Holder becomes unavailable to provide its contracted reserve volumes, the TSOs will secure the necessary reserve volumes; the TSOs have proposed a DASSA top-up mechanism (subject to a SEMC decision) to incentivise service providers to maintain service availability in real time. Thus, the proposed design harmonises the application of the Compensation Payment pre- and post-gate closure, applying it in all cases where the TSOs must procure alternative reserve volumes.

8.5.2 Post-gate Closure Delivery Incentives

The TSOs propose that an Event Performance Scalar will be calculated based on the delivered service of a unit against the expected response during a system frequency event or in the event of a TSO dispatch instruction. Delivery incentives are not concerned with the availability of the reserve volumes and therefore do not directly interact with the Compensation Payment or the Availability Performance Scalar within the same Trading Period.

However, for energy storage units, delivering a service could mean risking unavailability for DASSA Order obligations in subsequent Trading Periods or being unable to capture potential price spikes in the energy markets in subsequent Trading Periods. Therefore, there may be situations in which a unit may not want to deliver a service, even when available to do so.

However, as TSOs, we expect service providers with DASSA Orders to respond to frequency events/ dispatch instructions. Therefore, strong incentives are necessary to ensure service providers respond

[50] Section 5 (EirGrid); Section 5 (SONI)

appropriately and face consequences if they do not deliver a service, when available and called upon to do so. Given the infrequency of system frequency events, the incentive for required response performance should be sufficiently strong. Additionally, the incentive for service delivery should ideally be greater than the combined availability incentives for the subsequent Trading Periods for which an energy storage unit is expected to be unavailable after delivering a service.

AFRY has considered these interactions between different availability and service delivery incentives in their study. AFRY has proposed a design for the Event Performance Scalar to restrict the occurrence of misaligned incentives by establishing a hierarchy between the incentives for service delivery and availability in the subsequent Trading Periods, under the expected market conditions. Furthermore, the implementation of a Grace Period (see Section 8.10) will also help mitigate the risk of non-delivery of a service from energy storage units.

The above, however, does not completely address situations where an energy storage unit does not deliver a service in anticipation of high price spreads in the energy markets. The TSOs have recommended that the RAs consider the development and implementation of a BCOP specifically for the system services market.

TSOs' Proposal:

Layered incentive mechanism for DASSA Orders to be implemented, consisting of:

- **Pre-Gate Closure Incentives - Compensation Payment**:
  - To apply to lapsed DASSA Orders at gate closure.
  - To reflect the cost borne by TSOs in procuring alternative reserve volumes.
- **Post-Gate Closure Availability Incentives – Compensation Payment and Availability Performance Scalar:**
  - To apply to Confirmed DASSA Orders post gate closure.
  - Impact of availability incentives to be greater than that of the Compensation Payment to ensure accurate ex-ante visibility of available reserves.
- **Post-Gate Closure Delivery Incentive - Event Performance Scalar**:
  - To apply to Confirmed DASSA Orders post gate closure.
  - Impact of the incentives for delivering a reserve service to be greater than the impact of the incentives for reserve volume availability in subsequent trading periods.

Structured hierarchy of incentives to be as follows:

- Post-Gate Closure Availability Incentives to be stronger than Pre-Gate Closure Incentives.
- Service Delivery Incentive to be sufficiently strong and exceed the applicable availability incentives over the subsequent Trading Periods during which an energy storage unit may become unavailable following the delivery of a service.

Question 9: Do you have any comments on the proposed Commitment Obligations & Incentives process overview and hierarchy?

8.6 Pre-Gate Closure – Application of Compensation Payment

This section sets out the TSOs' proposal for the application of the Compensation Payment at gate closure.

The TSOs have considered two options for the application of the Compensation Payment at gate closure:

1. Apply to all lapsed Orders with exceptions for TSO actions (preferred by TSOs)
2. Apply to all lapsed Orders with no exceptions

8.6.1 Option 1 – Apply Compensation Payment to Lapsed Orders with Exceptions

The TSOs' preferred proposal for the application of the Compensation Payment at gate closure is as follows:

- Compensation Payments will be payable to the TSOs when a DASSA Order is not fully or partially compatible with the service provider's FPN or when the DASSA Order has been fully or partially self-lapsed by the service provider. Compensation Payments will be proportionate to the volume of the lapsed Order.
- The only exceptions to the above that will apply are:
    - Where a DASSA Order Holder has lapsed due to TSO instructions /actions / frequency events.
    - Where the DASSA Order for the Trading Period falls within a Grace Period (see Section 8.10), following the delivery of a service by the service provider.

8.6.1.1 Rationale for Option 1

There are three main reasons why a DASSA Order Holder might submit a non-compatible FPN and be unavailable for the provision of the service:

1. **Forced Outage**: The service provider is facing an unexpected outage.
2. **Commercial Choice**: The service provider makes a commercial decision not to deliver the service, possibly because energy provision intraday is more attractive.
3. **TSO Actions**: Pre-gate closure TSO instructions or any automated response to a frequency event, meaning the service provider is not able to provide the committed volumes.

Service providers have no control over forced outages, which prevent them from capturing income from various markets such as the energy market, capacity market, and the DASSA. In such cases, they should self-lapse or trade their obligation in secondary trading.

Where a service provider makes a commercial decision not to deliver the contracted service, the TSOs propose that a compensation payment should be made. This reflects the voluntary nature of the decision, which may be influenced by the pursuit of alternative commercial opportunities.

Service providers cannot control TSO actions, which are often necessary to ensure secure system operation for reasons like voltage control, network congestion and maintaining sufficient inertia. Nor can service providers control the occurrence of frequency events. Requiring a Compensation Payment to be payable in such cases would be disproportionate, as service providers have limited control over these actions.

The Compensation Payment could, in theory, be indirectly recouped through Balancing Market bidding. The TSOs' considerations on this option are set out in Section 8.6.2 below.

8.6.2 Option 2 – Apply Compensation Payment to All lapsed Orders

Under this option, any failure to fulfil a DASSA Order at gate closure would result in a Compensation Payment being payable to the TSOs, irrespective of the reason for the lapsed Order.

To account for this risk, DASSA Order holders could reflect this potential cost in their Balancing Market bids, which may lead to a more economically efficient outcome. There would be a dependency on the value of the Compensation Payment being predictable.

8.6.2.1 TSO Commentary on Option 2

In addition to the rationale for exempting lapsed Orders resulting from TSO actions, as set out in Section 8.6.1 above, the TSOs have concerns with any proposal requiring service providers to reflect the cost of the Compensation Payment into their BM bids:

- Incorporating additional costs into BM bids would make DASSA Order Holders less competitive compared to non-DASSA Order Holders. The TSOs consider that this would be deemed discriminatory under Article 16(7) of the EBGL[51], which prohibits discrimination between BM bids submitted under a balancing capacity contract and those submitted outside of such a contract. The TSOs cannot prioritise DASSA Order Holders over non DASSA Order Holders in scheduling and dispatching (activation of) balancing energy.
- The current Bidding Code of Practice (BCOP) in the SEM does not allow for opportunity costs to be reflected in the techno-economic data used for non-energy actions. The BCOP has never allowed the inclusion of Short Notice Declaration or Generator Performance Incentive charges within complex Commercial Offer Data (COD) submitted to the SEM.

TSOs' Proposal:

Proposals for the application of the Compensation Payment at gate closure are:

- Option 1 (TSOs' preferred option): Compensation Payment to be payable to the TSOs when a DASSA Order is not compatible with the service provider's FPN or has been self-lapsed. The exceptions to this are:
    - Where a DASSA Order has lapsed due to TSO actions.
    - Where the DASSA Order for the Trading Period falls within a Grace Period after service delivery.
- Option 2: Compensation Payment to be payable to the TSOs for any incompatible DASSA Order at gate closure, regardless of the reason for the lapsed Order.

Question 10: Do you have any comments on the proposals for the application of the Compensation Payment, noting the TSOs' preferred approach?

[51] Electricity Balancing Guideline

8.7 Value of Compensation Payment

This section describes the TSOs' proposals for the value of the Compensation Payment.

8.7.1 Overview of Compensation Payment Options

The TSOs collaborated with our partner AFRY to identify and evaluate various options for the design of the Compensation Payment, as follows:

1. No Compensation: No Compensation Payment to apply, with the DASSA Order Holder simply foregoing the DASSA payment in case of a lapsed Order.
2. Dynamic Compensation: A Compensation Payment linked to the counterfactual income captured through trading in the Intraday Market, i.e. the Inframarginal Rent (IMR) available through the Intraday Market.
3. DASSA Price: A Compensation Payment linked to the DASSA clearing price.
4. Adjusted DASSA Price minus the DASSA Price: A Compensation Payment linked to the delta between an adjusted DASSA clearing price and the actual DASSA clearing price, with the adjusted DASSA clearing price reflecting what the price would have been if the lapsed volumes had not participated in the auction. The adjusted DASSA clearing price can be calculated in two ways:
    a) Ex-post: This approach would use actual clearing data to simulate a counterfactual price by re-clearing the DASSA auction, excluding the volumes associated with service providers who failed to submit compatible FPNs. It would provide a retrospective view of the clearing price that would have resulted had only reliable volumes participated and would reflect the actual cost of replacement incurred by the TSO.
    b) Ex-ante: This approach would use a forecast of lapsed volumes to simulate a counterfactual price by re-clearing the DASSA auction, excluding an ex-ante estimate of volumes expected to submit incompatible FPNs. This estimate would be based on historical data. It would provide a forward-looking view of the clearing price that would have resulted had only expected-to-deliver volumes participated and would reflect the expected cost of replacement faced by the TSO.
5. RAD Price: A Compensation Payment linked to the price determined in the proposed RAD should there be any residual volumes.
6. System Security Cost: A Compensation Payment linked to the Value of Lost Load.

Of these, options 2 to 5 are 'dynamic' in the sense that the Compensation Payment amount would vary as a function of a market price (or prices). Option 6 is 'static' in the sense that the Compensation Payment would be a function of the fixed Value of Lost Load set by the SEMC. Option 1 serves as the base case in our assessment.

The primary consideration in assessing these options is the extent to which they will create the desired incentives for DASSA Order Holder to meet their obligations, as this is a key objective of the Compensation Payment.

8.7.2 Analysis of Compensation Payment Options

There are different options available to a DASSA Order Holder in respect of a given DASSA Order. The DASSA Order Holder can either:

- Meet their DASSA Commitment Obligation under the DASSA Order;
- Sell their DASSA Order in the secondary market; or

- Lapse their DASSA Order.

The TSOs consider that the Compensation Payment should be designed to incentivise DASSA Order Holders to either meet their Commitment Obligation or sell their DASSA Order in the secondary market, rather than choose to lapse their DASSA Order when the revenue available to them from the Intraday Market is higher than their DASSA revenues.

Regardless of the design and level of the Compensation Payment, an Order Holder will retain its DASSA revenue if they meet their DASSA Commitment Obligation. Similarly, if an Order Holder sells its DASSA Order in the secondary market (and sells their energy into the Intraday market instead), they will come away with the inframarginal rent from the Intraday Market, together with the value of the secondary trade, irrespective of the design and level of the Compensation Payment.

However, the design of the Compensation Payment influences the revenues available to the DASSA Order Holder in the case where they choose to lapse their DASSA Order:

- In the case of no Compensation Payment, Order Holders may be incentivised to lapse their Order whenever the Intraday IMR available to them exceeds the DASSA revenue.
- Where the Compensation Payment is linked to the DASSA price, there will be a weaker incentive for Order Holders to lapse their Orders, as the Intraday IMR available to them must exceed twice their DASSA revenue in effect (as they would need to firstly forego their DASSA revenue and secondly pay the same amount back via the Compensation Payment).
- Where the Compensation Payment is linked to the delta between the adjusted DASSA price and the DASSA price, or to the RAD price, the additional incentive beyond the base case depends on the magnitude of the delta, or of the RAD price, respectively.
- Where the Compensation Payment is linked to the Dynamic Compensation, there should never be an incentive to lapse an Order because any Dynamic Compensation available to the Order Holder will effectively be paid back via the Compensation Payment.

The above incentives (excluding the System Security Cost option) are summarised in

Table 13 below.

Table 13: Summary of Compensation Payment Option Incentives

Scenario	No Compensation	Dynamic Compensation	DASSA price	Adjusted DASSA price minus DASSA price[1]	RAD price
Provider meets their DASSA Commitment Obligation	Provider retains their DASSA revenue under all potential Compensation Payment designs				
Provider chooses to sell their DASSA order in the secondary market	Intraday IMR + Price of the secondary trade* under all potential Compensation Payment designs				

Provider chooses to lapse their DASSA order	Provider retains their Intraday IMR	Provider retains zero net revenue as any Intraday IMR is included in the Compensation payment	Provider retains Intraday IMR minus the DASSA price	Provider retains their Intraday IMR minus the delta between the adjusted DASSA price and the actual DASSA price	Provider retains their Intraday IMR minus the RAD price

Note: (1) The summary of the Adjusted DASSA price minus DASSA price captures both the ex-ante and ex-post options.

While this table relates to the case of upward reserve, similar conclusions apply in the case of downward reserve in that the design of the Compensation Payment influences the revenues available to the DASSA provider only in the case where it chooses to lapse its DASSA Order.

8.7.3 Evaluation Outcome

While the objective of the Compensation Payment design is to create appropriate incentives for DASSA Order Holders, the TSOs and AFRY have also assessed the different options identified against some additional criteria:

- **Appropriate Incentives**: Ensure DASSA Order volumes are made available by submitting a compatible FPN or finding replacement volumes in the secondary market.
- **Cost Reflection**: The Compensation Payment value should reflect a best estimate of the cost borne by the TSOs in securing replacements for the reserve volumes lapsed by the DASSA Order Holder or in case of unavailability.
- **Ability to Implement**: The Compensation Payment should be implementable given the wider requirements imposed and decisions made by the SEMC.
- **Predictability**: Allow market participants to predict the level of the Compensation Payment.

This assessment also includes the 'static' Compensation Payment option based on the fixed Value of Lost Load – labelled the 'System Security Cost' option.

The summary of this assessment is set out in Table 14 below.

Table 14: Compensation Payment Options Assessment Summary

Assessment Criterion	Compensation Payment Options						
	No Compen-sation	Dynamic Compen-sation	DASSA price	Ex-Ante Adjusted DASSA price minus DASSA price	Ex-Post Adjusted DASSA price minus DASSA price	RAD Price	System security cost
Appropriate incentives	○	◕	◔	◑	◕	◔	◔
Cost-reflectivity	○	○	◑	◑	◕	◑	◑
Ability to Implement	●	◔	●	◔	◔	◕	◕
Predictability	●	●	◕	●	◑	◑	●

Table 14: Overview of assessment of Compensation Payment options. The greater the shaded area within the Harvey Ball, the higher the score i.e. ● > ◕ > ◑ > ◔ > ○ .

The incentives under the 'No Compensation' for DASSA Order Holders are 'weak'.

The 'Dynamic Compensation' option is the one that creates the strongest incentive for DASSA Order Holders to meet their Commitment Obligation or trade in the secondary market, as it removes any benefit service providers can derive from the Intraday Market. It is also highly predictable as a result. However, it would be challenging to implement as it requires information on the specific costs incurred by different service providers. It would also not necessarily be reflective of the cost incurred by the TSOs in procuring alternative sources of reserve.

The 'DASSA price' and 'RAD price' options are relatively easy to implement and reasonably cost-reflective and predictable, but do not create strong incentives for DASSA Order Holders.

The 'Ex-post Adjusted DASSA price minus DASSA price' option scores relatively well in terms of creating appropriate incentives. It is also reasonably cost reflective. However, from an initial view, it would not be implementable in time for DASSA go-live. It may be seen as more difficult to predict by market participants.

The 'System Security Cost' option is relatively easy to implement (assuming it is a static value) and predictable. It is also to a degree, cost-reflective, albeit that the cost being reflected is the cost in the event of lost load, which does not necessarily follow from insufficient reserve. This option is also relatively weak in terms of the incentives it creates.

On balance, as the 'Ex-post Adjusted DASSA price minus DASSA price' option (Option 4a) scores well in terms of cost-reflectivity, the TSOs propose this as our preferred option, subject to implementation considerations. By contrast, while defining the adjusted DASSA price ex-ante (option 4b) allows the Compensation Payment to be known in advance, this comes at the cost of relying on an estimate that may not reflect actual system conditions.

The TSOs also considered the possibility of including a parameter that would have the effect of reducing the Compensation Payment as the notice given by the service provider of their intention to lapse increased, i.e. the earlier the service provider notified the TSO that they were going to lapse their order, the lower the Compensation Payment they would face. However, we consider that this could potentially limit activity in the secondary trading market as Order Holders may be incentivised to lapse their DASSA Orders as early as they could rather than looking for opportunities to secondary trade.

8.7.4 Proposal for Calculation of Compensation Payment

The TSOs' preferred option for the calculation of the Compensation Payment is Option 4a: the delta between the adjusted DASSA clearing price and the DASSA clearing price, where the the adjusted DASSA clearing price is calculated ex-post to account for actual lapsed Orders. This approach is based on the assessment that a Compensation Payment is essential to strengthen incentives for DASSA Order Holders. Among the various options considered, the ex-post adjusted DASSA clearing price minus the DASSA clearing price offers the most appropriate incentives, although predictability and the ability to implement remain a concern. If intraday prices shift significantly within-day compared to day-ahead expectations, DASSA Order Holders may lapse even when this is inefficient from a system perspective.

In the case that Option 4a is not feasible to implement for DASSA go-live, the TSOs next preferred option is the DASSA price (Option 3) due to its ease of implementation and predictability for service providers.

The TSOs consider that offering a lower payment for early notice could undermine the secondary trading market. Order Holders may choose to lapse DASSA Orders early to avoid paying the full Compensation Payment, potentially reducing secondary trading market activity. Therefore, the TSOs recommend that the same Compensation Payment should apply regardless of the timing of the lapse, ensuring consistent and effective incentives for maintaining system stability and security.

TSO's Proposal:

Several options for the value of the Compensation Payment have been considered:

- The TSOs' preferred Option is 4a: the delta between the Adjusted DASSA Price and the DASSA Price, where the Adjusted DASSA Price is calculated ex-post, subject to implementation considerations.
- Should the above option not be possible to implement for DASSA go-live, the TSOs' next preferred option is the DASSA Price (Option 3).
- No reduced Compensation Payment to apply in instances of early self-lapsing.

Question 11: Do you have any comments on the options for the calculation of the Compensation Payment, noting the TSOs' preferred option, and the proposal that no reduced Compensation Payment will apply to early self-lapsing?

8.8 Post-gate Closure - Availability Incentives

This section describes the TSOs' proposals to incentivise DASSA Order Holders to maintain availability to provide contracted services in real-time.

8.8.1 Overview

As discussed in Section 8.4, the TSOs consider that it is important that the incentives for DASSA Order Holders to maintain availability post gate closure are greater than the pre-gate closure incentive, that is, the Compensation Payment on its own. This hierarchy promotes accurate submission of service provider availability and avoids situations where service providers can arbitrage between lapsing and post gate closure unavailability.

Therefore, the TSOs propose that the post-gate closure availability incentive should comprise:

- Compensation Payment (and forfeit of the DASSA payment) for the applicable Trading Period.
- Availability Performance Scalar.

The TSOs propose that the Post Gate Closure Availability Incentive will apply to unavailable confirmed DASSA Order volumes in real-time. In line with the SEMC decision in SEM-24-066[52], DASSA

[52] SEM-24-066: Section 4.1 (semcommittee.com)

payments will be foregone in these instances, However, these incentives will not apply to those unavailable DASSA Orders volumes resulting from TSO actions / events or for Trading Periods falling within a Grace Period, post-delivery of a service by the unit.

8.8.2 Availability Incentive Options

The TSOs and AFRY have considered several options to incentivise DASSA Order Holders to maintain availability, including:

1. Application of a performance scalar on subsequent DASSA income, in addition to the Compensation Payment (preferred by TSOs).
2. Temporary exclusion of a service provider from subsequent DASSA auctions for a time-limited period.
3. Volume derating in subsequent DASSA auctions.
4. Availability one-off payment.

Table 15 below summarises the TSOs' evaluation of the incentives.

Table 15: Availability Incentive Options Assessment Summary

Assessment Criterion	Availability Incentive Options			
	Availability Performance Scalar & Compensation Payment	Temporary exclusion	Volume derating	Availability One-off payment
Appropriate incentives	◕	◑	◕	◑
Proportionality	◕	◑	◕	◑
Ability to Implement	◕	◑	◑	●
Predictability	◕	●	◕	◕

8.8.3 Option 1 - Availability Performance Scalar

This section sets out the TSOs' proposed design and rationale for the Availability Performance Scalar. The design of the Compensation Payment to apply to unavailable DASSA Orders in real-time is as per Section 0 above.

The proposed design for the Availability Performance Scalar (S_A) will have two essential components:

- Availability Factor (F_A)
- Dynamic Time Scaling Factor (V_m).

These elements together define the Availability Performance Scalar (S_A).

8.8.3.1 Availability Factor (F_A)

The Availability Factor (F_A) assesses the DASSA Order Holder's availability performance against confirmed DASSA volumes, feeding into the determination of the Availability Performance Scalar (S_A). It is defined as the weighted average of the unit's monthly availability performance over a period of 5 months. The calculation is as follows:

$$F_A = \left(\sum_{m=M}^{M-4} \left[1 - \frac{capacity\ unavailable_m}{confirmed\ capacity_m} \right] \frac{V_m}{3} \right)$$

Where:

- F_A is the Availability Factor.
- $Confirmed\ capacity_m$ refers to the total volume of confirmed DASSA orders held by the service provider in month *m*.
- $Confirmed\ capacity_m$ represents the total volume of confirmed DASSA orders that the service provider did not make available during the corresponding Trading Period in month m*m*. If the unavailability is due to a post-gate closure TSO action, preventing the DASSA Order Holder from delivering its contracted reserve volume, those volumes are excluded from this calculation.
- M represents the current settlement month.
- V_m is the Dynamic Time Scaling Factor weighting allocated to month m*m*.

8.8.3.2 Dynamic Time Scaling Factor (V_m)

The Dynamic Time Scaling Factor (V_m) assigns pre-defined weightings to the current settlement month and the last 4 months. A total of five months of performance history for a service provider is considered, with each month's weight decreasing progressively from the current settlement month (M) to the earliest month considered (M-4), as illustrated in Table 16 below:

Table 16: Availability Scalar Dynamic Time Scaling Factor

Number of months between the unavailability incident month and the settlement month (M)	Dynamic Time Scaling Factor (V_m)
M	1
M-1	0.8
M-2	0.6
M-3	0.4
M-4	0.2

8.8.3.3 Availability Performance Scalar (S_A)

The Availability Performance Scalar (S_A) is defined by the following expression:

$$S_A = \begin{cases} 1, & F_A > b \\ \dfrac{F_A - a}{b - a}, & F_A > a \\ 0, & a > F_A \end{cases}$$

Where:

- b and a constants are set at 0.97 and 0.50 respectively.

The resulting Availability Factor (F_A) and Availability Scalar (S_A) can be represented by the curve provided in Figure 13 below.

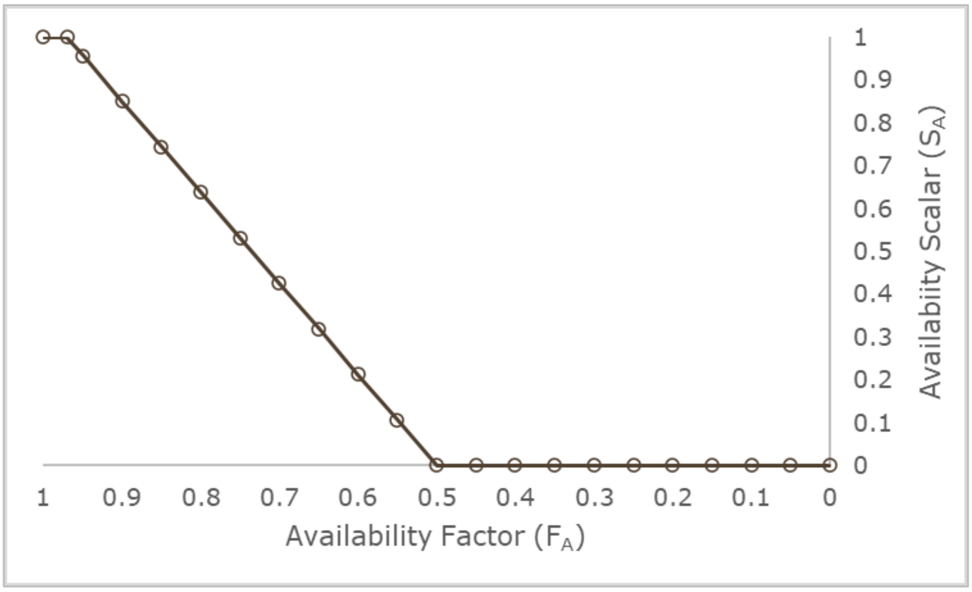

Figure 13: Availability Performance Scalar Design

The formula for the Availability Performance Scalar (S_A) operates through a linear reduction mechanism. This scalar decreases in line with the monthly weighted average availability, which is calculated based on a unit's confirmed DASSA Order volumes. The Availability Factor takes into account the last five months of availability performance of the service provider, with more recent months assigned higher weightage to emphasise recent performance history.

There is a tolerance of 3% built into the scalar, allowing for small levels of unavailability without affecting the scalar, which remains at 1. This tolerance is incorporated to account for any reasonable forced outages that a service provider may face. If the weighted average availability of a unit drops to 0.5 or below, the scalar becomes 0.

It is important to note that the Compensation Payment and the forfeit of DASSA payment will continue to apply for every unavailable reserve volume post gate closure, irrespective of whether the resulting Availability Factor for a unit is in the 3% tolerance band.

8.8.3.4 Rationale for TSOs' Preference

The TSOs consider that the proposed post-gate closure incentives – Compensation Payment plus Availability Performance Scalar – provide the best optimum incentives for DASSA Order Holders to maintain availability in real time.

The application of a scalar on DASSA income is the preferred option by the TSOs because it ensures that service providers are financially motivated to maintain availability. This approach directly impacts their incomes from Trading Periods within the current and future settlement months, rewarding those who consistently meet availability requirements and promotes overall system reliability and efficiency. As noted in Section 4.4 of AFRY's report, service providers with less-than-ideal performance are still expected to participate in the DASSA, although with less competitive bids as they may reflect the impact of the scalar in their submitted DASSA bids. This balance helps contain the risk of reserve scarcity, as the capacity is still available in the market and can provide reserves during system tightness.

A scalar-based approach can be designed to manage the participation of units with varying availability records in a way that supports system reliability. While the scalar does not directly reduce or exclude the volumes offered by service providers — unlike a de-rating mechanism — it can significantly reduce or nullify DASSA payments for a certain period for units with poor or unacceptable availability performance. This approach maintains inclusivity by allowing all service providers to participate, while still incentivising improved performance. By calibrating the scalar appropriately, the method balances the need to secure sufficient reserve volumes with the goal of minimising the risk of volume insufficiency.

The scalar-based incentive is proportional to DASSA payments, meaning service providers that frequently clear the DASSA receive a stronger incentive in absolute terms. This approach ensures a more proportionate impact, as the scalar applied to monthly payments aligns the incentive with the revenues earned through DASSA. Extending the suspension of the DASSA payment and the application of the Compensation Payment to post-gate closure unavailable volumes ensures that all the service providers have a base level incentive to maintain availability, irrespective of the revenues they earn from the DASSA. This also addresses any situations where a service provider is expected to clear DASSA very infrequently over the persistence period of the scalar, thereby limiting the absolute monetary impact of the scalar.

The scalar based approach limits the dependence on fluctuations in the DASSA clearing price on a Trading Period to Trading Period basis. This ensures that the impact of post-gate closure incentives for availability remains smoother and more consistent, even during periods with low DASSA clearing prices. Additionally, the design incorporates an element of persistence in assessing a service provider's availability performance, which serves as a deterrent against sustained underperformance and reinforces the importance of maintaining reliable availability over time.

8.8.4 Option 2 - Temporary Exclusion from Subsequent DASSA Auctions

Under this option, a service provider would be excluded from participating in the DASSA for a given period, proportionate to its unavailability to fulfil its DASSA Order obligations.

8.8.4.1 Benefits

Temporary exclusion would offer a clear and transparent incentive for service providers to maintain availability over time. By applying the exclusion only after a defined number of unavailability instances within a given timeframe, it would target repeated underperformance while avoiding penalisation for isolated events.

8.8.4.2 Challenges

Excluding service providers could lead to a less competitive auction environment, potentially increasing costs for reserve procurement. Furthermore, implementing temporary exclusions requires careful monitoring and enforcement, adding complexity to the auction process. This approach might not effectively balance the need for reliable reserve volumes with the operational and financial impacts on service providers.

Moreover, the exclusion of service providers could result in a concentration of market power among fewer participants, potentially leading to higher prices and reduced efficiency in the auction process. This could undermine the overall goal of maintaining a competitive and fair market.

If the threshold for triggering a temporary exclusion is set too high, the incentive signal to maintain availability may be weakened. The binary nature of this approach may also limit its ability to proportionally reflect varying levels of underperformance, reducing its effectiveness as a nuanced incentive mechanism.

Post AFRY's analysis, the TSOs consider that an uplift to the IT design would be required to manage the exclusions. This would present a significant implementation risk for DASSA go-live, particularly in the case where service providers were to be excluded on a per product basis. Additionally, the administrative burden associated with tracking and enforcing exclusions could divert resources from other critical operational tasks, further complicating the management of the DASSA auctions. The potential for disputes and appeals related to exclusions could also introduce delays and uncertainties, affecting the timely procurement of necessary reserves.

8.8.5 Option 3 - Volume De-rating in Subsequent DASSA Auctions

Under this option, a derating factor would be applied to the volumes offered by service providers in subsequent DASSA auctions, reducing the effective volume that service providers can offer if they fail to maintain availability.

8.8.5.1 Benefits

As volume derating directly affects the capacity service providers can offer, it can create a strong incentive to maintain availability to avoid future derating. While not inherently proportionate, the derating factor could be calibrated to reflect the extent of underperformance, offering a degree of scalability in its application.

8.8.5.2 Challenges

Determining the appropriate derating factor and ensuring fair application across service providers may require complex calculations and adjustments. The complexity and potential for disputes over derating calculations could outweigh the benefits, making this option less favourable compared to the scalar-based incentive.

Additionally, volume derating could disproportionately impact smaller service providers who may have less flexibility in managing their reserve commitments. This could reduce the diversity of participants in the DASSA auctions, potentially leading to a less resilient and adaptable reserve market. The administrative complexity of implementing and monitoring derating factors could also increase operational costs and introduce additional layers of oversight, potentially slowing down the auction process and reducing overall efficiency.

8.8.6 Option 4 – Availability One-off Penalty

Under this option, service providers who fail to maintain availability would face a one-off penalty. This penalty would be a financial charge imposed upon the occurrence of non-compliance, with the aim of creating a deterrent against failing to meet availability requirements, ensuring that service providers are incentivised to meet their commitments.

The one-off penalty would be calibrated such that the penalty for unavailability post-gate closure would be greater than that prior to gate closure, i.e. the Compensation Payment, to maintain the hierarchy of incentives. This would be done by defining the one-off penalty as a function of the Compensation Payment: for example, set the penalty in each Trading Period ($Availability\ Penalty_t$) equal to the Compensation Payment in the same period ($Compensation_t$) multiplied by a scaling factor P_A, where P_A would be greater than 1.

$$Availability\ Penalty_t = Compensation\ Payment_t \times P_A$$

The level of P_A would be calibrated to reflect the additional social cost arising when units declare unavailability post gate closure, as opposed to lapsing before gate closure.

Under this proposal, service providers which declare unavailability post-gate closure pay the one-off Availability Penalty only and are not subject to the Compensation Payment, with the penalty only applying to the applicable Trading Period(s) (no persistence).

8.8.6.1 Benefits

Compared to the Availability Performance Scalar, a potential benefit of this option is that it may avoid a risk of distorted bidding behaviour in the DASSA. For example, service providers subject to a scalar may increase their bids in periods during which that scalar applies to account for reduced payments; if such a service provider was a marginal unit the DASSA Clearing Price would be increased because of the scalar. With a one-off payment, bidders into the DASSA may be incentivised to adjust their DASSA bids for a Trading Period based on the expectation of unavailability in that period, rather than their historical unavailability.

A further potential benefit is that a one-off payment may be more straightforward to implement than mechanisms requiring ongoing adjustments to future payments.

8.8.6.2 Challenges

A one-off payment, that would just apply to the Trading Period(s) for which a DASSA Order Holder was unavailable, would need to be sufficiently punitive to meet the TSOs' goal of incentivising and maintaining a consistently reliable service provider base. While it would offer a clear and immediate deterrent against non-compliance, this approach could have several adverse effects on market participation and competition. Imposing substantial financial penalties might discourage smaller service providers from participating in the DASSA, thereby reducing competition and potentially increasing costs for reserve procurement. Additionally, the financial strain on service providers could impact their operational stability and long-term market involvement, leading to a concentration of market power among fewer, larger participants. This could undermine the goal of maintaining a competitive and fair market. The absence of persistence in this option may also not promote the continuous compliance of service providers.

In comparison with the persistence of the scalar approach, a one-off payment would be more sensitive to fluctuations in the DASSA Clearing Price in individual Trading Periods, i.e. the penalty may be of a magnitude far greater than a low clearing price.

In the case that P_A was required to be a dynamic value to reflect the additional social cost arising when units declare unavailability post gate closure, this may not be implementable for DASSA go-live, depending on the input data and the complexity of calculation required.

TSO's Proposal:

Several options for the Post-Gate Closure Availability Incentives for DASSA Order Holders have been considered:

- Application of a Compensation Payment and forfeit of DASSA Payment for the applicable Trading Period, and application of an Availability Performance Scalar on future DASSA payments (TSOs' preferred option).
- Temporary exclusion of a service provider from subsequent DASSA auctions for a time-limited period.
- Volume derating in subsequent DASSA auctions.
- One-off payment.

Availability Performance Scalar (S_A) to consist of two components:

- Availability Factor (F_A) to assess the service provider's performance against confirmed DASSA volumes over five months, with more recent months weighted higher.

- Dynamic Time Scaling Factor (V_m) to assign weightings to performance incidents over the current and four preceding months.

Any unavailable confirmed DASSA Order volumes resulting from TSO instructions or events and confirmed DASSA Orders for the Trading Periods falling within the Grace Period, to be exempt from the application of the Post-Gate Closure Availability Incentives; however, the DASSA Payments will be foregone.

Question 12: Do you have any comments on the Post-Gate Closure Availability Incentive options, noting the TSOs' preferred option?

8.9 Post-gate Closure - Delivery Incentives

This section describes the TSOs' proposals to incentivise DASSA Order Holders to deliver contracted services when called upon to do so, whether in response to a frequency event or dispatch instruction, in the form of an Event Performance Scalar.

8.9.1 Delivery Incentive Options

The TSOs and AFRY have considered several options to incentivise DASSA Order Holders to respond to frequency events or dispatch instructions in real-time, including:

1. Application of a performance scalar on subsequent DASSA income (TSOs' preferred option).
2. Temporary exclusion of a service provider from subsequent DASSA auctions for a time-limited period.
3. Volume derating in subsequent DASSA auctions.
4. Delivery once-off payment.

Table 17 below summarises the TSOs' evaluation of the delivery incentives.

Table 17: Delivery Incentive Options Assessment Summary

Assessment Criterion	Delivery Incentive Options			
	Event Performance Scalar	**Temporary exclusion**	**Volume derating**	**Delivery One-off payment**
Appropriate incentives	◕	◑	◕	◑
Proportionality	◕	◑	◕	◑
Ability to Implement	◕	◑	◑	●
Predictability	◕	●	◕	◕

Details of Option 1, which is the TSO's preferred option, are described in Section 8.9.2 below. The TSOs prefer this option because it provides a proportional and consistent incentive for maintaining delivery, aligning financial rewards with performance and promoting overall system reliability and efficiency.

For Options 2 and 3, the benefits and challenges are as detailed in Sections 8.8.4 and 8.8.5 above. A one-off payment for delivery is described in Section 8.9.5 below. These options are less preferred due to concerns about reducing market participation and competition, increasing administrative complexity, and potentially leading to higher costs and market power concentration.

8.9.2 Option 1 - Event Performance Scalar

8.9.2.1 Overview

For the post-gate closure delivery incentive, the key objective is to incentivise the holder of a confirmed DASSA Order to deliver the service when called upon.

The proposed evaluation of whether a service provider's response to a frequency event or dispatch instruction is acceptable will leverage existing performance monitoring methods utilised under the DS3 Regulated Tariff Arrangements. Additionally, the application of the scalar shall extend to the payments made for the volumes procured by the TSOs through the proposed DASSA Top-Up mechanism, namely the Residual Availability Determination (RAD), subject to approval by the SEMC.

The proposed methodology for the Event Performance Scalar largely uses the same criteria defined in the DS3 Regulated Tariff Arrangements for performance assessment, with minor changes to suit the DASSA application. While the performance assessment criteria defined in the DS3 Regulated Tariff Arrangements serve as a starting point, future updates may be required to expand the scope and adapt in line with the experience from the DASSA operation. Potential considerations include the inclusion of over-delivery of a required response in the assessment criteria and more frequent performance assessments, which may be continually monitored and considered for adaptation in the DASSA.

Any post-gate closure delivery incentive must encourage service providers to meet the response performance required by the TSOs. This need is amplified by the expectation of very infrequent occurrence of system frequency events requiring activation of reserve services. Therefore, the proposed mechanism must provide a sufficiently strong incentive to the service providers for service delivery. Furthermore, as discussed in Section 8.4, it is crucial that the incentive for service delivery is greater than the incentives for availability in the subsequent Trading Periods, for which an energy storage unit can be expected to be unavailable post delivering a service. While the Grace Period mitigates the situation to a certain extent, the units will still face forfeit of DASSA payments for unavailable/lapsed DASSA Orders within the Grace Period. The TSOs, together with our partners AFRY, have taken these considerations into account in our analysis and optimised the design to provide a sufficient incentive for the service providers to deliver a service, when called upon and available to do so, and maintain the required hierarchy under most of the expected market conditions.

8.9.2.2 Event Performance Scalar Design

Our proposed methodology for the Event Performance Scalar (S_E) is primarily derived from the existing formula used for calculating the Performance Incident Response Factor under the current Regulated Tariff Arrangements[53]. However, we propose to make necessary adjustments to ensure its applicability within the DASSA framework.

The Event Performance Scalar (S_E) which ranges from 1 to 0, will be calculated monthly. Values below 1 will lead to reduced payments for the DASSA [and the reserve volumes cleared by the service provider via any DASSA Top-Up Mechanism]. The formula will take into account the performance of the service provider over the previous months, in accordance with the Performance Assessment methodologies defined for the DS3 Regulated Tariff Arrangements.

The calculation of the Event Performance Scalar (S_E) involves two key elements:

- Monthly Scaling Factor (K_m).
- Dynamic Time Scaling Factor (V_m).

8.9.2.3 Monthly Scaling Factor

Under the DS3 Regulated Tariff Arrangements, each Performance Incident is evaluated using a Performance Incident Scaling Factor (Q_i) which reflects the service provider's response according to the Performance Assessment methodologies. The Performance Incident Scaling Factor (Q_i), as defined the in the DS3 Regulated Tariff Arrangements, correctly and appropriately assesses the delivered response by a service provider against the required response, while allowing for acceptable

[53] DS3 System Services Protocol (EirGrid); DS3 System Services Protocol (SONI)

tolerance. A Q_i value of 0 indicates a Pass, a value of 1 indicates a Fail, and values between 0 and 1 represent Partial Passes.

The Monthly Scaling Factor (K_m) is calculated as the average of all Q_i values from the performance assessments conducted within a given calendar month.

$$K_m = average(Q_{i,m})$$

where:

- M refers to the month in which the performance incidents occurred
- i refers to the performance incident number within that month (e.g., 1, 2, etc.)
- Q refers to the Performance Incident Scaling Factor

The Performance Assessment methodologies are detailed in the DS3 Regulated Tariff Arrangements Protocol Document[54] and have not been reproduced in this consultation paper.

For the Performance Incident Scaling Factor (Q_i) to be applicable within the DASSA framework, we propose to update the Expected Response calculation, which contributes to its calculation. This update should include the term "confirmed DASSA Order volumes [and any volumes cleared ex-post through a DASSA Top-Up Mechanism] (see Section 8.9.2.7 below) for the specific response service," along with other terms, in the minimum value determination condition defining Expected Response. This change ensures that the Performance Incident Scaling Factor calculation applies only to the confirmed DASSA order volumes [and the reserve volumes cleared by the service provider via any DASSA Top-Up Mechanism].

8.9.2.4 Dynamic Time Scaling Factor

The Dynamic Time Scaling Factor (V_m) consists of pre-defined weightings assigned to the current settlement month and the two preceding months. These weightings emphasise more recent performance incidents in the calculation of the Event Performance Scalar. Performance history for a service provider is considered over three months, with the weight decreasing progressively from the current settlement month to (M) the earliest month considered (M-2).

The proposed Dynamic Time Scaling Factor approach marks a shift from the approach currently in the DS3 Regulated Tariff Arrangements methodology, which considers performance history over the rolling past five-month window, including the current settlement month. The primary reason for this change is to reduce the persistence of the Event Performance Scalar (S_E) and limit its long-term impact. Excessive weighting of past months or considering historical performance over extended periods can disproportionately penalise a unit for poor performance over a long duration. Since the Event Performance Scalar (S_E) can indirectly lead to a unit's exclusion from the DASSA if reflected in bid submissions, a prolonged impact could result in unnecessarily extended exclusion.

The Dynamic Time Scaling Factor (V_m) is defined as shown below in Table 18.

Table 18: Event Performance Scalar Dynamic Time Scaling Factor

Number of months between the performance incident month and the settlement month (M)	Dynamic Time Scaling Factor (V_m)
M	1
M-1	0.5

[54] DS3 System Services Protocol (EirGrid); DS3 System Services Protocol (SONI)

M-2	0.1

8.9.2.5 *Event Performance Scalar (S_E)*

The Event Performance Scalar (S_E) is calculated by summing the products of the Monthly Scaling Factor (K_m) and the Dynamic Time Scaling Factor (V_m) as defined above. It is calculated based on the below formula:

$$S_E = max\left(1 - \sum_{m=M}^{M-2} [\,K_m \times V_m],\qquad 0\right)$$

Both the Monthly Scaling Factor (K_m) and the Event Performance Scalar (S_E) are rounded to two decimal places.

8.9.2.6 *Rationale for TSOs' Preference*

The above formula is designed to meet specific objectives and considerations. It incentivises the delivery of services and ensures that the impact is proportional by applying the scalar to the monthly payments received by a service provider. This means that the impact on the unit is proportional to the revenues earned by the unit in the DASSA, providing stronger incentives for units that frequently clear the DASSA compared to those that rarely win a DASSA contract.

The duration of persistence is also crucial. The incentive provided to service providers must be sufficiently penal and maintain a hierarchy between the incentives for delivering a response and for availability in subsequent trading periods, especially if the unit is an energy storage unit. Since the impact of the Event Performance Scalar is limited by the payments received under DASSA [and any DASSA Top-up Mechanism], it may be challenging to maintain a sufficiently penal impact for service providers that infrequently clear the market. Adding persistence to the scalar's design allows for a higher impact window while adhering to the proportionality principle.

8.9.2.7 *DASSA Top-Up Mechanism*

The TSOs propose that the Event Performance Scalar will apply to a service provider's confirmed DASSA Order volumes and any reserve volumes cleared by the service provider via a DASSA Top-Up Mechanism. Please refer to Section 11 for more information on the TSOs' proposed DASSA Top-Up Mechanism.

8.9.2.8 *Delivery Scalar Applicability Proposal*

The TSOs propose the following approach for the applicability of the Event Performance Scalar:

- The Event Performance Scalar (S_E) will apply to service providers based on their confirmed DASSA Order volumes made available [or cleared in any DASSA Top-up Mechanism ex-post] and their delivery performance.
- The Performance Incident Scaling Factor (Q_i) will be modified to include those volumes in a confirmed DASSA Order [or cleared in any DASSA Top-up Mechanism ex-post]. This ensures that the assessment of delivery performance considers only the reserve volumes for which the service providing unit is compensated for.
- The Performance Incident Scaling Factor (Q_i) will be defined as the minimum of the total volumes in a confirmed DASSA order [and cleared in any DASSA Top-up Mechanism ex-post] and other parameters related to the technical capabilities and the reserve availability position of the service providing unit at that time. This prevents duplication of incentives on the reserve volumes, as any volumes related to a confirmed DASSA order that were not made

available will be subjected to the Availability Performance Scalar and the Compensation Payment.

- Settlement payments for DASSA [and potentially any DASSA Top-up Mechanism ex-post] will be reduced based on the scalar value, meaning lower scalar values result in proportionally reduced payments.
- The Event Performance Scalar (S_E) will be applied to DASSA payments [and payments in any DASSA Top-up Mechanism ex-post] for reserve volumes made available

For example, if a service providing unit has 60 MW of available reserve volume for a service and wins a confirmed DASSA order of 50 MW, the Performance Incident Scaling Factor (Q_i) will consider the volumes contracted under the confirmed DASSA order (i.e., 50 MW) in the event of a performance incident. If the unit's position shifts due to its commercial decision to trade energy post BM Gate Closure without a dispatch instruction from the TSOs, resulting in only 30 MW of reserve capacity available for the contracted service, the Performance Incident Scaling Factor (Q_i) will consider the actual availability of the unit (i.e., 30 MW). The remaining 20 MW reserve volume not made available will be subjected to the Availability Performance Scalar and the Compensation Payment.

8.9.3 Option 2 - Temporary Exclusion from Subsequent DASSA Auctions

Under this option, a service provider would be excluded from participating in the DASSA for a given period, proportionate to its inability to fulfil its DASSA Order obligations when called upon to do. The benefits and challenges of this option are as per Section 8.8.4 above.

8.9.4 Option 3 – Volume De-rating in Subsequent DASSA Auctions

Under this option, a derating factor would be applied to the volumes offered by service providers in subsequent DASSA auctions, reducing the effective volume that service providers can offer if they do not deliver a contracted service when called upon to do so. The benefits and challenges of this option are as per Section 8.8.5 above.

8.9.5 Option 4 – Delivery One-off Payment

Under this option, service providers who fail to deliver contracted services when called upon to do so would face a one-off financial penalty. This penalty would be a financial charge imposed upon the occurrence of non-compliance, with the aim of creating a deterrent against failing to deliver contracted services when called upon, ensuring that service providers are incentivised to meet their commitments.

The one-off penalty would be calibrated such that the penalty for failure to deliver is greater than the penalty for declaring unavailability post-gate closure, which in turn would be greater than the penalty for lapsing prior to gate closure, i.e. the Compensation Payment, to maintain the hierarchy of incentives.

This would be done by defining the one-off penalty as a function of the Compensation Payment: for example, set the penalty in each Trading Period ($Event\ Performance\ Penalty_t$) equal to the Compensation Payment in the same period ($Compensation_t$) multiplied by a scaling factor P_E:

$$Event\ Performance\ Penalty_t = Compensation\ Payment_t \times P_E$$

The value of P_E would be set so it is (a) greater than 1 and (b) greater than the scaling factor for the Availability Penalty P_A, discussed in Section 8.8.6. The level of P_E would be calibrated to reflect the additional social cost arising when units fail to deliver contracted services when called upon to do so, as opposed to lapsing before gate closure.

Under this proposal, service providers which fail to deliver when called upon to do so pay the one-off Event Performance Penalty only and are not subject to the Availability Penalty or the Compensation Payment, with the penalty only applying to the applicable Trading Period(s) (no persistence).

8.9.5.1 Benefits

Compared to the Event Performance Scalar, a potential benefit of this option is that it may avoid a risk of distorted bidding behaviour in the DASSA, as described in Section 8.8.6 above.

8.9.5.2 Challenges

The challenges of this option are as per Section 8.8.6 above.

TSO's Proposal:

Several options for the Post-Gate Closure Delivery Incentives for DASSA Order Holders have been considered:

- Event Performance Scalar (TSOs' preferred option).
- Temporary exclusion of a service provider from subsequent DASSA auctions for a time-limited period.
- Volume derating in subsequent DASSA auctions.
- One-off payment.

Event Performance Scalar to consist of two components:

- Monthly Scaling Factor (K_m) to be the average of Q_i values from performance assessments within a month.
- The Dynamic Time Scaling Factor (V_m) to assign weightings to Monthly Scaling Factor (K_m) for the current and two preceding months.

Event Performance Scalar to also apply to any DASSA Top-Up Mechanism.

Question 13: Do you have any comments on the Post-Gate Closure Delivery Incentive options, noting the TSOs' preferred option?

8.10 Grace Period

In our DASSA Design Recommendation Paper[55], the TSOs recommended that a Grace Period should apply to energy storage units impacted by a previous dispatch instruction or response to a frequency event, resulting in the asset being depleted to the extent that it cannot fulfil its service obligation for multiple Trading Periods. We recommended that during this Grace Period, the service provider would not be subject to a Compensation Payment and may receive scaled payments for its DASSA Order, depending on the remaining duration of the Grace Period.

While the SEMC decided that no unit will be eligible for partial or scaled DASSA payments[56], the TSOs see the benefit of a Grace Period in relation to Commitment Obligations and Incentive mechanisms. This period will allow energy storage units time to re-establish their availability after delivering a service. Without a Grace Period, the risk of becoming unavailable and facing Compensation Payments and the Availability Performance Scalar could discourage units from delivering the required service.

The TSOs propose a Grace Period duration of eight hours from the time of the response to the frequency event. This duration aligns with the approach currently used for DS3 Fixed Contract service providers.

TSOs' Proposal:

Grace Period to be applicable to energy storage units impacted by previous TSO instructions or events, with a proposed duration of eight hours from the time of the response to the frequency event.

Question 14: Do you have any comments on TSOs' proposal for a Grace Period for energy storage units?

[55] Section 5.1 (EirGrid); Section 5.1 (SONI)
[56] SEM-24-066: Section 4.1 (semcommittee.com)

9 Bundles of Services

9.1 Introduction

This section sets out the TSOs' proposals for the procurement of bundles of services for DASSA go-live, which take precedence over all related proposals and recommendations made by the TSOs to date.

9.2 Bundles Overview

As set out in the TSOs' DASSA Design Recommendations Paper, and approved in SEM-24-066[57], the design of the daily auction allows for the procurement of:

- Individual reserve services.
- An explicit bundle of reserve services, to be defined as a separate product in the daily auction.
- An implicit bundle of reserve services, to be established from individual bids for individual reserve services in the clearing of the daily auction.

Our recommendations paper noted that the precise nature of the services to be procured in the daily auction would be subject to the outcome of the DASSA Product Review and Locational Methodology consultation[58].

The TSOs acknowledge that the development of the TSOs' service bundling proposition has been set out in several published DASSA papers. The SEM Committee has also made decisions concerning the bundling of system services in several papers. To provide clarity on this matter, the TSOs summarised the key TSO recommendations and applicable SEMC decisions in our DASSA Volume Forecast Methodology Recommendation paper[59].

9.3 Explicit Bundles

An explicit bundle of services is a bundle that would be defined as an individual product to be procured in the DASSA. Service providers would be able to submit bids specifically for these bundles.

In our DASSA Product Review & Locational Methodology Recommendation Paper, the TSOs did not recommend the procurement of reserve services through an explicit bundled product in the daily auction, the rationale being that the TSOs' studies have not identified a specific system operational need for a bundle of services. This position was reiterated in the TSOs' DASSA Volume Forecast Methodology Recommendation paper[60], which also noted that explicit bundles, or those arising from linked bids, will not be in scope for implementation at DASSA go-live

In SEM-24-074[61], the SEMC decided that there is a need to further explore options for bundling products in the DASSA and that a separate workstream is to be established by the TSOs in this regard. The SEMC's position was reiterated in SEM-25-011[62], together with direction that the TSOs should

[57] SEM-24-066: Section 2.1 (semcommittee.com)
[58] Section 3.1 (EirGrid); Section 3.1 (SONI)
[59] Section 5.2 (EirGrid); Section 5.2 (SONI)
[60] Section 5.3 (EirGrid); Section 5.3 (SONI)
[61] SEM-24-074: Section 4 (semcommittee.com)
[62] SEM-25-011: Section 6 (semcommittee.com)

design the auction to allow for the procurement of explicit bundles post DASSA go-live as quickly as is practical.

The TSOs have concerns that explicit bundles would reduce liquidity in the DASSA, as service providers would have to split their available service volume between bids for explicit bundles and those for individual services, thus potentially reducing competitiveness for both bundles and the individual services in the daily auction. In addition, the TSOs also consider that defining an explicit bundle of services would not be compliant with the EBGL: Article 26 1(b) requires "*a demonstration that standard products are not sufficient to ensure operational security and to maintain the system balance efficiently or a demonstration that some balancing resources cannot participate in the balancing market through standard products*" (emphasis added). Since explicit bundles are not required to ensure operational security, and do not enable resources that could not participate in the balancing market to participate, the TSOs would not have a justification to define a new explicit bundle product to be procured in the DASSA.

The TSOs will further examine concerns related to explicit bundles as part of the future separate bundling workstream.

9.4 Implicit Bundles

An implicit bundle of reserve services is a bundle that would be established from individual bids for individual services (e.g. FFR sub-categories, POR, SOR and TOR1) in the clearing of the DASSA. A minimum volume requirement for the bundle would be set as a constraint in the clearing of the auction. In addition, predefined value functions, based on the TSOs' willingness to pay for the continuous provision of services above the volume set for the implicit bundle constraint, would be added to the objective function of the DASSA clearing optimisation.

In our DASSA Product Review & Locational Methodology Recommendation Paper, the TSOs recommended that a process be developed by which implicit bundles of reserve services could be defined in a flexible way, with the objective to support efficient auction outcomes. In the TSOs' DASSA Volume Forecast Methodology Recommendation paper[63], we described the benefits of implicit bundles, including providing flexibility for service providers and ensuring participation of all technology types in the auction. We also noted that bundles – explicit and implicit – can address concerns relating to the exclusion of excess volume from the ex-ante energy markets, which may occur if individual services of varying volumes are procured from multiple service providers; the procurement of a bundle of several consecutive services in a continuous manner from a limited number of service providers would mitigate against this issue, allow for a more efficient allocation of resources and ultimately provide better value for the consumer. Given that the TSOs did not recommend the procurement of reserve services through an explicit bundled product, we recommended that such market efficiencies could be facilitated through the implementation of implicit bundles.

In SEM-24-074[64], the SEMC decided that the TSOs can use implicit bundles only to account for system needs. The SEMC reiterated this position in SEM-25-011[65]. The TSOs subsequently sought clarification as to the precise meaning of this decision: the RAs advised that operational system needs are what

[63] Section 5.2 (EirGrid); Section 5.2 (SONI)
[64] SEM-24-074: Section 4 (semcommittee.com)
[65] SEM-25-011: Section 6 (semcommittee.com)

are being referred to in the decisions, and that market efficiencies are not considered as operational system needs.

As noted above, the TSOs' studies have not identified a specific system operational need for a bundle of services. Therefore, for DASSA go-live, the TSOs propose that implicit bundles will not be implemented, i.e. we will not specify a daily volume requirement for implicit bundles (the default will be 0 MW) nor implement value functions in the objective function of the DASSA clearing optimisation to capture the TSOs' willingness to pay for the continuous provision of services.

9.5 Bundles Summary

For the reasons noted above, the TSOs propose that neither explicit nor implicit bundles of reserve services will be procured in the DASSA at go-live.

There will be no change to the auction format: a simple bidding process per service per Trading Period, with no interdependency between bids for different services or Trading Periods, will be implemented. For the avoidance of doubt, complex or combinatorial bidding will not be implemented for DASSA go-live.

As required by the SEMC, the TSOs will set up a separate work package to further evaluate bundles of services, and related mechanisms such as the linking of bids, as part of DASSA Day 2 activities, i.e. for implementation post DASSA go-live, the schedule for which is outlined under the 'Future DASSA Arrangements' work package in PIR V3.0. The TSOs intend that this work package will be concerned with the potential procurement of bundles of services post go-live and should not divert resources from the DASSA implementation.

TSOs' Proposal:

DASSA to procure individual reserve services only at go-live; neither explicit nor implicit bundles of services to be procured.

TSOs to evaluate the potential bundling of services, and related mechanisms such as the linking of bids, under the 'Future DASSA Arrangements' Work Package as outlined in PIR V3.0. Any implementation of bundling to occur post DASSA go-live.

Question 15: Do you agree with the TSOs' proposals to only procure individual services – and neither implicit nor explicit bundles – in the DASSA at go-live?

10 Service Quality Value Function

10.1 Introduction

This section sets out the TSOs' proposal for the application of the Value Function in the DASSA clearing objective function.

The Value Function allows for a preference to be applied in the clearing of the auction for the procurement of a quantity of a higher quality of service above any minimum volume for that quality that has been set as a constraint in the auction. In the case of the DASSA, the Value Function would apply a preference to the procurement of dynamic service provision over static service provision, above any minimum volume for dynamic service provision required to be procured in the auction.

10.2 Quality Value Function

10.2.1 Context

In the DASSA Product Review and Locational Methodology Recommendations Paper, the TSOs recommended the design of the upward and downward reserve services to be procured in the daily auction. In SEM-24-074, the SEMC approved this design (subject to a further product review being carried out in 2026)[66]. The TSOs' DASSA Volume Forecasting Methodology Recommendations paper recommends that the published daily reserve volumes will state volume requirements for all upward and downward reserve products, minimum service volumes per jurisdiction, and minimum volumes of dynamic response per service[67].

Table 19 below summarises the reserve service volume requirements for the DASSA, including the application of the Value Function.

Table 19: Mapping Minimum reserve requirements to the value functions

Auction Product	Auction Volume	Auction Constraint*	Value Function
FFR sub-category 1	All Island / Jurisdictions	Min Dynamic volume	Dynamic over Static
FFR sub-category 2	All Island / Jurisdictions	Min Dynamic volume	Dynamic over Static
FFR sub-category 3	All Island / Jurisdictions	Min Dynamic volume	Dynamic over Static
POR	All Island / Jurisdictions	Min Dynamic volume	Dynamic over Static
SOR	All Island / Jurisdictions	Min Dynamic volume	Dynamic over Static
TOR1	All Island / Jurisdictions	Min Dynamic volume	Dynamic over Static
TOR2	All Island / Jurisdictions	Min Dynamic volume	Dynamic over Static
RR	All Island / Jurisdictions	N/A	N/A

66 SEM-24-074 Future Arrangements for System Services Product Review and Locational Methodology Decision Paper (semcommittee.com)
67 Section 3.1 (EirGrid); Section 3.1 (SONI)

Note:

*To be applied to All-Island and Jurisdiction volumes.

The following example illustrates how the Value Function would interact with the service volume requirements (values are illustrative only):

- The TSOs set a volume requirement for POR in Ireland of 500 MW, of which 300 MW must be procured from dynamic service providers.
- If the TSOs set a Value Function of zero, the remaining 200 MW may come from either dynamic or static service providers, based on the price of submitted bid prices.
- If the TSOs set a Value Function of greater than zero, there would be a preference established in the auction clearing to procure dynamic over static service provision for the remaining 200 MW.

10.2.2 Proposal

The TSOs propose that the Value Function for all reserve services be set to zero for the go-live of the DASSA, i.e. the TSOs will not apply a preference for dynamic over static service provision, above the minimum dynamic volume requirement, in the clearing of the auction.

10.2.3 Rationale

The TSOs consider that the mechanisms for determining service volume requirements as set out in the TSOs' DASSA Volume Forecasting Methodology Recommendations paper are appropriate for the go-live of the daily auction, with no additional operational preference for dynamic service provision required[68].

The application of Value Functions may be useful in the future. However, any application of a Value Function greater than zero will be subject to detailed evaluation and appropriate engagement with industry.

TSOs' Proposal:

Value Function in the objective function to be set to zero for the go-live of the DASSA for all services, meaning that there will be no operational preference to procure dynamic over static service provision above the minimum auction dynamic volume requirement.

Question 16: Do you agree with the TSOs' proposal to set the Value Function in the objective function of the DASSA clearing to zero?

[68] Section 4.1 & 4.2(EirGrid); Section 4.1 & 4.2(SONI)

11 DASSA Top-Up Mechanism

11.1 Introduction

On 24 March 2025, the TSOs published our DASSA Top-Up Mechanism Consultation Paper[69]. In that paper, the TSOs described:

- The Joint Options Assessment process, involving the TSOs, the RAs and the RAs' advisors, NERA, that was implemented to evaluate alternatives to the Final Assignment Mechanism (FAM) following the SEMC decision not to approve the FAM in SEM-24-066[70].
- The proposal for the Residual Availability Determination (RAD), which incorporates ex-ante bids and ex-post execution of an auction based on real-time system needs.

The consultation period closed on 2 May 2025.

11.2 DASSA Top-Up Mechanism Considerations

Given that the DASSA top-Up mechanism is subject to a TSO Recommendation Paper and subsequent SEMC decision, the TSOs are not making any additional proposals relating to the proposed RAD at this time.

However, the TSOs note that the following considerations would need to be addressed should the RAD, or similar ex-post top-up mechanism, be implemented for DASSA go-live.

11.2.1 DASSA Top-Up Mechanism Default Price

The TSOs have proposed that an ex-ante bidding process would apply to the RAD, with the RAD merit order to be based on submitted bids. Consideration is needed as to whether a default price would apply to the RAD, and what the value of such a default price would be. A default price would apply to service providers that did not bid into the RAD but nonetheless had made themselves available for service provision in real-time.

11.2.2 DASSA Top-Up Mechanism Execution Threshold

The proposed RAD auction will execute if a real-time volume requirement has been identified for any combination of system service, zone (jurisdiction) and quality of service provision, e.g. dynamic POR in Ireland. It is necessary to consider the real-time volume deficit that would lead to RAD payments being calculated based on the RAD top-up auction. This volume deficit is defined as the volume procured in DASSA minus any lapsed orders and unavailable (partial/ full) Confirmed DASSA Order holders.

11.2.3 DASSA Top-Up Mechanism Delivery Incentives

The proposal for the RAD requires that those service providers that are available in real-time to provide a service deliver it when called upon to do so. The TSOs consider that incentives in the form of Event Performance Scalars should apply to RAD payments. Please refer to Section 8.9 above.

[69] DASSA Design Recommendations Paper (EirGrid); DASSA Design Recommendations Paper (SONI)
[70] SEM-24-066: Section 5.1 (semcommittee.com)

11.3 DASSA Top-Up Mechanism Schedule

The TSOs' consultation on the DASSA Top-Up Mechanism closed on 02 May 2025. The TSOs will submit a Recommendations Paper to the SEMC by the end of June, with a SEMC decision due in July, as per the timelines in PIR V3.0. The TSOs will then consider proposals for Parameters and Scalars for any DASSA Top-Up Mechanism, and industry engagement on same.

12 DASSA Fallback Mechanism

12.1 DASSA Fallback Procedures Proposal Summary

The TSOs propose that, in the case of a DASSA suspension or outage, the available reserve volumes in real-time will be settled through ex-post arrangements. This may occur either via the price formation generated in the proposed RAD[71] or, if the RAD is unavailable, at predefined tariffs applicable to all available reserve volumes. These predefined tariffs will be determined based on the log-run marginal cost (LRMC) associated with a battery service provider that is exclusively focused on reserve provision and is expected to consistently meet DASSA requirements throughout the year.

12.2 Fallback Procedure Context

Similar to the Price Floor, the Fallback Procedure is not specifically mentioned in either the TSOs' DASSA Recommendation Paper or the SEMC Decision Paper. Under this consultation paper the TSOs are inviting industry views on a Fallback Procedure in case of a DASSA suspension or outage.

The Fallback Procedure is designed to maintain the ongoing functionality of reserve markets in scenarios where the clearing algorithm is unable to generate results - either fully or partially - in a timely manner. These procedures may be implemented by the TSOs in instances of DASSA suspension, which may arise due to various technical complications, such as software malfunctions or the unavailability of critical data, among others.

12.3 Fallback Procedure Global Overview

AFRY's analysis examines how various countries establish Outage Prices, primarily through fallback procedures, which typically involve Shadow Auctions or reference prices based on historical data. It is important to clarify that the term "Fallback Procedure" encompasses a wide range of scenarios; however, the TSOs' proposal will focus solely on fallback procedures initiated by failures in the clearing algorithm, where the algorithm cannot produce results within the required timelines.

For more context on the above and how other countries and markets use historical prices to calculate default prices in response to market failures, please refer to Section 3.10 of AFRY's report.

12.4 Fallback Procedure Design

12.4.1 Fallback Procedure Design Approach Considerations

According to AFRY's report, in the event that the DASSA is not operational, the Fallback Procedure will be invoked for procuring reserve volumes. The proposed Fallback Procedure is based on ex-post settlement of the service providers that were available in real-time. Settlement will occur either through price formation in the DASSA Top-Up Mechanism, if the proposed mechanism by the TSOs is approved by the SEMC and is available at the time of the DASSA suspension. Otherwise, all the reserve volumes available in real time will be settled at predefined tariffs. These predefined tariffs will be

[71] Subject to the outcome of the consultation and SEMC final approval.

determined based on the LRMC applicable to a battery service provider dedicated solely to reserve provision, which is anticipated to consistently clear the DASSA throughout the year.

The DASSA Fallback Procedure for procuring reserves from service providers will vary depending on the specific type of failure that led to the initial DASSA auction not clearing. To establish a thorough approach that encompasses all potential outcomes, AFRY, in their report, outlines the Fallback Procedure covering two scenarios that may arise during a DASSA suspension (see Figure 14 below).

1.DASSA Suspension Only

In the event of a DASSA suspension, the TSOs will apply the DASSA Top-Up Mechanism to ensure the settlement of reserve volumes made available by service providers in real-time. In this scenario, the reserve volumes will be settled in accordance with the pricing methodology established under the DASSA Top-Up Mechanism.

Because service providers are not obligated to position themselves for reserve provision under this mechanism, it is understood that the TSOs will issue dispatch instructions as needed to ensure that the system consistently has the required volumes of reserves available.

2.DASSA and Top-Up Mechanism Unavailability

Under this scenario, AFRY outlines a situation where a system failure affects both the volume procurement channels defined in the high-level DASSA design. Due to the DASSA's failure, the TSOs will need to procure required reserve volumes through an ex-post reconciliation mechanism. Given that the failure also impacts the DASSA Top-Up Mechanism, in their report, AFRY indicates that they expect there to be no available price curve for the ex-post settlement process. As a result, the TSOs will settle all service providers who made available reserve volumes in real-time using pre-defined tariffs for each reserve product. These predefined tariffs will be determined based on the LRMC applicable to a battery service provider dedicated solely to reserve provision, which is anticipated to consistently clear the DASSA throughout the year.

The TSOs anticipate that the Fallback Procedure in this scenario would be handled by business process. However, as the final design for the Fallback Procedure is unknown at this stage, there would be a significant risk to DASSA go-live.

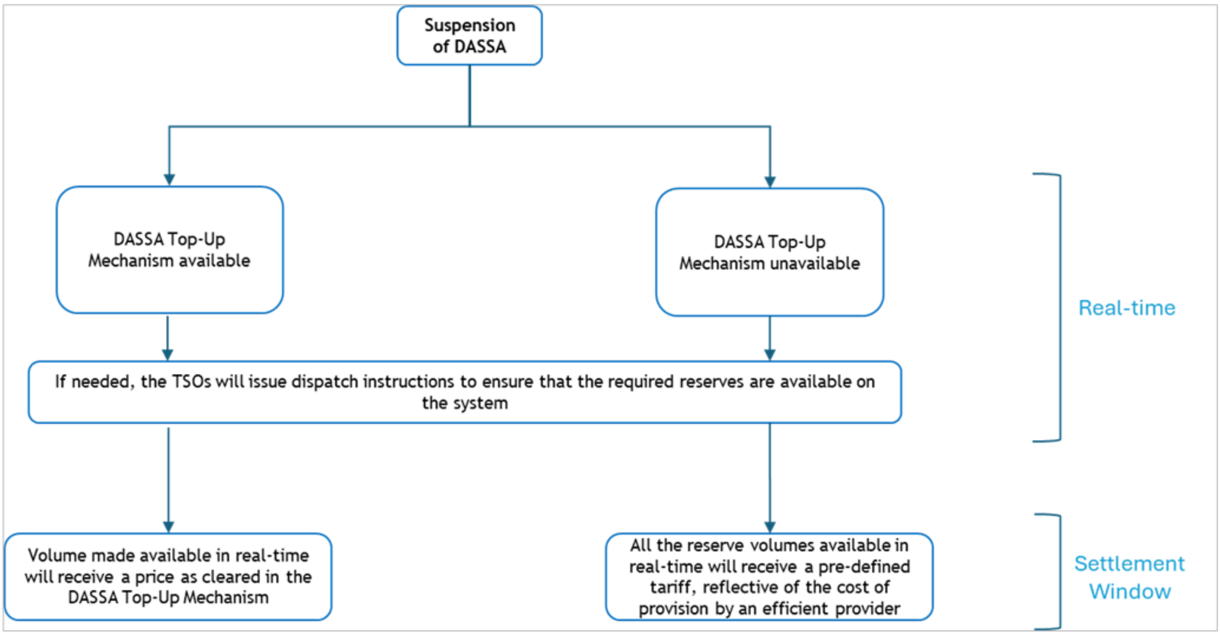

Figure 14: Process Map for the Implementation of the DASSA Fallback Procedure

12.5 Fallback Procedure Proposal

The TSOs propose the implementation of a Fallback Procedure. Under this procedure, the available reserve volumes in real-time will be settled through ex-post arrangements. The settlement will occur through the proposed RAD mechanism, if approved by the SEMC and available in the event of the DASSA suspension. Otherwise, the TSOs will use predefined tariffs to settle all the reserve volumes available in real time. The predefined tariffs will be established based on the LRMC associated with a BESS dedicated solely to reserve provision, expected to always meet DASSA requirements throughout the year.

TSOs' Proposal:

A Fallback Procedure, as outlined in this section, to be implemented for the DASSA.

Question 17: Do you have any comments on the proposed DASSA Fallback Procedure design and value determination?

13 Next Steps

This consultation will be open for 7 weeks, closing on 25 July 2025. Responses to the consultation should be submitted to the EirGrid (link) or SONI (link) consultation portals.

Should stakeholders have any questions or comments during the consultation period these can be submitted to FASS@Eirgrid.com or FASSProgramme@soni.ltd.uk.

An industry workshop, at which the TSOs will present these proposals and facilitate a Q&A for interested parties, will take place as part of the Future Power Markets Industry Workshop on Wednesday 18 June 2025. A separate workshop to present the worked examples and facilitate a Q&A will be held in the subsequent weeks (the date and location are to be confirmed and will be communicated to customers and stakeholders in due course).

All consultation responses will be shared with the RAs.

Following this consultation, the TSOs will submit a recommendations paper to the SEMC for decision in October 2025, as per the timelines in the Phased Implementation Roadmap (PIR V3.0).

14 Appendices

14.1 Appendix A - Secondary Trading Pricing Examples

The below examples show how secondary trading is cleared under normal condition (when scarcity condition does not apply).

14.1.1 Example 1

This example illustrates how secondary trading will be optimised in the absence of non-divisible bids.

Table A-1: Order book (Example 1)

Service	Order	Type	Price	Quantity [MW]	Acceptance Ratio	Traded Volume [MW]	Accepted in Merit?
POR-Dynamic	Buy	Divisible	€12	150	0	0	N/A
POR-Dynamic	Buy	Divisible	€15	9	0	0	N/A
POR-Dynamic	Buy	Divisible	€25	17	1	17	yes
POR-Dynamic	Buy	Divisible	€36	6	1	6	yes
POR-Dynamic	Buy	Divisible	€48	45	1	45	yes
POR-Dynamic	Buy	Divisible	€59	55	1	55	yes
POR-Dynamic	Buy	Divisible	€65	5	1	5	yes
POR-Dynamic	Buy	Divisible	€70	30	1	30	yes
POR-Dynamic	Sell	Divisible	€10	15	1	15	yes
POR-Dynamic	Sell	Divisible	€18	115	1	115	yes
POR-Dynamic	Sell	Divisible	€24	120	0.23333	28	yes
POR-Dynamic	Sell	Divisible	€35	12	0	0	N/A
POR-Dynamic	Sell	Divisible	€40	25	0	0	N/A
POR-Dynamic	Sell	Divisible	€46	23	0	0	N/A
POR-Dynamic	Sell	Divisible	€58	30	0	0	N/A
POR-Dynamic	Sell	Divisible	€90	68	0	0	N/A

As shown in Table A-1 above, a total of 158 MW is traded at the Secondary Trading Clearing Price of €24.

The Secondary Trading Clearing Price is determined by the marginal, partially accepted Sell Order, which offers 120 MW at the price of €24. This is the highest accepted Sell Order. This means that the seller does not incur a disadvantage from the partial acceptance of its Order and, consequently, has no incentive to submit it as a non-divisible bid.

All accepted Sell Orders were priced below the clearing price (i.e., at €18 and €10), while all accepted Buy Orders were priced above it (i.e., at €25, €36, €48, €59, €65, and finally €70).

These accepted orders, on both the buy and sell sides, are strictly in merit.

14.1.2 Example 2

This example illustrates that, even in the presence of non-divisible bids, general principle for clearing secondary trading can still apply. This is because there is no out of merit accepted bid.

Table A-2: Order book (Example 2)

Service	Order	Type	Price	Quantity [MW]	Acceptance Ratio	Traded Volume [MW]	Accepted in Merit?
POR-Dynamic	Buy	Non-divisible	€12	150	0	0	N/A
POR-Dynamic	Buy	Divisible	€15	9	0	0	N/A
POR-Dynamic	Buy	Non-divisible	€25	17	1	17	yes
POR-Dynamic	Buy	Divisible	€36	6	1	6	yes
POR-Dynamic	Buy	Non-divisible	€48	45	1	45	yes
POR-Dynamic	Buy	Divisible	€59	55	1	55	yes
POR-Dynamic	Buy	Non-divisible	€65	5	1	5	yes
POR-Dynamic	Buy	Non-divisible	€70	30	1	30	yes
POR-Dynamic	Sell	Divisible	€10	15	1	15	yes
POR-Dynamic	Sell	Non-divisible	€18	115	1	115	yes
POR-Dynamic	Sell	Divisible	€24	120	0.23333	28	yes
POR-Dynamic	Sell	Divisible	€35	12	0	0	N/A
POR-Dynamic	Sell	Non-divisible	€40	25	0	0	N/A
POR-Dynamic	Sell	Non-divisible	€46	23	0	0	N/A
POR-Dynamic	Sell	Divisible	€58	30	0	0	N/A
POR-Dynamic	Sell	Non-divisible	€90	68	0	0	N/A

Similar to Example 1 above, a total of 158 MW is traded at the clearing price of €24. Although non-divisible orders were submitted, there is no difference in the result compared to Example 1 and all the accepted orders remain strictly in merit.

14.1.3 Example 3

This example illustrates a scenario where the setting of the Secondary Trading Clearing Price based on a marginal, partially accepted order leads to a payments imbalance between sellers and buyers due to the presence of on-divisible bids. In such cases, an appropriate pricing mechanism must be developed to address and resolve the imbalance issue resulting from the standard marginal pricing mechanism.

Table A-3: Order book (Example 3)

Service	Order	Divisibility	Price	Quantity [MW]	Acceptance proportion	Traded volume [MW]	Accepted in merit?
POR-Dynamic	Buy	Non-divisible	€12	150	0	0	N/A
POR-Dynamic	Buy	Divisible	€15	9	0	0	N/A
POR-Dynamic	Buy	Non-divisible	€25	17	0	0	N/A
POR-Dynamic	Buy	Divisible	€36	6	1	6	yes
POR-Dynamic	Buy	Non-divisible	€48	45	1	45	yes
POR-Dynamic	Buy	Divisible	€59	55	1	55	yes
POR-Dynamic	Buy	Non-divisible	€65	5	1	5	yes
POR-Dynamic	Buy	Non-divisible	€70	30	1	30	yes
POR-Dynamic	Sell	Divisible	€10	15	1	15	yes
POR-Dynamic	Sell	Non-divisible	€18	25	1	25	yes
POR-Dynamic	Sell	Divisible	€24	50	1	50	yes
POR-Dynamic	Sell	Divisible	€35	35	0.171	6	yes
POR-Dynamic	Sell	Non-divisible	€40	45	1	45	No
POR-Dynamic	Sell	Non-divisible	€46	23	0	0	N/A
POR-Dynamic	Sell	Divisible	€58	30	0	0	N/A
POR-Dynamic	Sell	Non-divisible	€90	68	0	0	N/A

As shown in Table A-3 above, a total of 141 MW is traded at a clearing price of €35.

Following the standard marginal pricing mechanism, the Secondary Trading Clearing Price is set by the marginal, partially accepted Sell Order, which offers 35 MW at the price of €35.

However, due to the presence of non-divisible orders, a Sell Order priced at €40 is accepted in full to maintain the balance between the total of buy and sell volumes. Since this order is non-divisible, it cannot be partially accepted, even though it is not strictly in merit. This constitutes a paradoxically accepted sell bid.

Rather than accepting the non-divisible Sell Order at a price of €40, as an alternative outcome of the clearing optimisation it might be possible to scale back accepted buy orders or accept additional sell orders to maintain the volume balance between both sides. However, reducing the volume on the Buy side can result in a substantial welfare loss. For example, the Buy Order at a price of €25, being non-divisible, would likely need to be dropped in full. However, in practice the choice between the feasible outcomes is determined through an optimisation process that seeks to maximise the social welfare while ensuring the volume balance between the sell and buy sides.

Based on the standard marginal pricing mechanism, the Secondary Trading Clearing Price should be set at €35. However, in this case, setting the Secondary Trading Clearing Price at €35 leads to a payment imbalance: the total payment from buyers would be 141 x 35 = €4935, whereas only 96 MW

(141 - 45 MW) of the sell orders are willing to trade at €35. The 45 MW Sell Order offered at €40, which was accepted to meet the volume balance, would incur a loss of (€40 - €35) x 45= €225.

In this example, the highest accepted Sell Order is at €40, which exceeds both the partially accepted Sell Order at €35 and the lowest accepted Sell Order at €36.As a result, the simple merit order does not hold, primarily due not the non-divisibility of the Sell Order of €40. As mentioned above, if the Secondary Trading Clearing Price is set at €35, there would be insufficient funds owed to the accepted Sell Order priced at €40.

To ensure payment balance between buyers and sellers, one option would be to adjust the Secondary Trading Clearing Price. If λ refers to the adjusted clearing price, the following condition must be satisfied:

$45.(40 - 35) = 141(\lambda - 35)$

This results in the Secondary Trading Clearing Price of $\lambda = €36.5957$.

However, this clearing price will push the 6 MW Sell Order offered at €36 out of merit. Therefore, it becomes impossible to determine a single clearing price that lies below all accepted buy offers and above all accepted sell offers. This underscores the need for suitable pricing mechanism to resolve such discrepancies and support the resulting set of accepted orders.

14.1.4 Example 4

This example illustrates scenarios in which multiple clearing prices could result from the outcome of the clearing optimisation process.

Table A-4: Order book (Example 4)

Service	Order	Divisibility	Price	Quantity [MW]	Acceptance Ratio	Traded volume [MW]	Accepted in merit?
POR-Dynamic	Buy	Non-divisible	€120	140	1	140	No
POR-Dynamic	Buy	Divisible	€150	9	0	0	N/A
POR-Dynamic	Buy	Non-divisible	€250	17	1	17	No
POR-Dynamic	Buy	Divisible	€360	6	0	0	N/A
POR-Dynamic	Buy	Non-divisible	€480	45	1	45	No
POR-Dynamic	Buy	Divisible	€590	55	0.982	54	yes
POR-Dynamic	Buy	Non-divisible	€650	5	1	5	yes
POR-Dynamic	Buy	Non-divisible	€700	30	1	30	yes
POR-Dynamic	Sell	Divisible	€10	15	1	15	yes
POR-Dynamic	Sell	Non-divisible	€18	25	1	25	yes
POR-Dynamic	Sell	Divisible	€24	50	1	50	yes
POR-Dynamic	Sell	Divisible	€35	35	1	35	yes
POR-Dynamic	Sell	Divisible	€40	45	1	45	yes
POR-Dynamic	Sell	Non-divisible	€46	23	1	23	yes

POR-Dynamic	Sell	Divisible	€58	30	1	30	yes
POR-Dynamic	Sell	Non-divisible	€90	68	1	68	yes

As shown in Table A-4 above, a total of 291 MW is traded at the Secondary Trading Clearing Price of €590.

The clearing price is determined by the marginal, partially accepted buy bid, which offers 55 MW at the price of €590.

As highlighted in red in the above table, some buy orders are paradoxically accepted at offered prices below the €590. However, in contrast to Example 3, setting the Secondary Trading Clearing Price at €590 will not result any shortage in the resources.

As shown in Table A-4 above, the highest accepted sell order is €90 and the lowest accepted buy order is €120, so the clearing price can be set anywhere between €90 and €120.

14.2 Appendix B - Secondary Trading Clearing in instance of Volume Insufficiency Examples

Examples 1, 2, and 3 focus on clearing the secondary trading in the instance of volume insufficiency condition. The underlying assumption in these examples is that the volume deficit identified for the services exceeds the volume insufficiency threshold. As a result, the volume insufficiency condition applies to all the examples presented below.

14.2.1 Example 1

In Table B-1, the POR-Dynamic service is subject to scarcity conditions during a specific trading period in DASSA, resulting in a volume deficit of 100 MW. To mitigate this shortfall, the TSOs place a sell order for 100 MW in the order book, at the price of €0. In this example, optimisation is applied to clear the secondary trading.

As illustrated in the last two rows of Table B-1, there are also two sell orders submitted by other providers: one offering 10 MW at €20 and another offering 30 MW at €50. However, because the scarcity condition applies to this trading period, these providers' sell orders will not be considered in the matching process.

Table B-1: Order book (Example 1)

Service	Order	Divisibility	Price	Quantity [MW]	Acceptance proportion	Traded volume [MW]	In merit where accepted?
POR-Dynamic	Buy	Non-divisible	-€12	150	0	0	N/A
POR-Dynamic	Buy	Divisible	€15	9	0.444	4	yes
POR-Dynamic	Buy	Non-divisible	€25	17	0	0	N/A
POR-Dynamic	Buy	Divisible	€36	6	1	6	yes
POR-Dynamic	Buy	Non-divisible	€48	45	0	0	N/A
POR-Dynamic	Buy	Divisible	€59	55	1	55	yes
POR-Dynamic	Buy	Non-divisible	€65	5	1	5	yes
POR-Dynamic	Buy	Non-divisible	€70	30	1	30	yes
POR-Dynamic	Sell	Divisible	0	100	1	100	yes
POR-Dynamic	Sell	Divisible	€20	10	0	0	N/A
POR-Dynamic	Sell	Divisible	€50	30	0	0	N/A

In addition, a service provider has submitted a buy order for 150 MW at -€12. However, clearing optimisation will not process this order, as the sell order is listed at a price of zero in the order book.

In this example, 100 MW is traded at a price of €15 in secondary trading to address the volume deficit identified for POR-Dynamic in DASSA. As mentioned in Section 6, TSOs do not propose a mechanism for financial settlement of secondary trades between buyers and sellers at the Secondary Trading

Clearing Price (€15 in this case). However, the net price applicable to all buyers will be determined by subtracting €15 from the Scarcity Price.

14.2.2 Example 2

In this example, the Simple Matching approach under scarcity condition, as outlined in Section 7.2.1, is used to clear the secondary trading. Compared to Example 1, the cleared buy-side offers remain unchanged; however, the Secondary Trading Clearing Prices, which is displayed in the last column of the table B-2 below, vary for each individual accepted buy order in the order book.

Table B-2: Order book (Example 2)

Service	Order	Divisibility	Price	Quantity [MW]	Acceptance proportion	Traded volume [MW]	In merit where accepted?	Secondary Trading Clearing Price
POR-Dynamic	Buy	Non-divisible	-€12	150	0	0	N/A	N/A
POR-Dynamic	Buy	Divisible	€15	9	0.444	4	yes	€15
POR-Dynamic	Buy	Non-divisible	€25	17	0	0	N/A	N/A
POR-Dynamic	Buy	Divisible	€36	6	1	6	yes	€36
POR-Dynamic	Buy	Non-divisible	€48	45	0	0	N/A	N/A
POR-Dynamic	Buy	Divisible	€59	55	1	55	yes	€59
POR-Dynamic	Buy	Non-divisible	€65	5	1	5	yes	€65
POR-Dynamic	Buy	Non-divisible	€70	30	1	30	yes	€70
POR-Dynamic	Sell	Divisible	0	100	1	100	yes	N/A
POR-Dynamic	Sell	Divisible	€20	10	0	0	N/A	N/A
POR-Dynamic	Sell	Divisible	€50	30	0	0	N/A	N/A

Similar to Example 1, 100 MW is traded to address the volume deficit identified for POR-Dynamic in DASSA. The net price for each accepted buy order is calculated by subtracting the associated Secondary Trading Clearing Price from the Scarcity Price.

14.2.3 Example 3

In Table B-3, due to 500 MW volume deficit, scarcity condition applies to the POR-Dynamic service in a specific DASSA trading period. To address this, the TSOs submit a sell order for 500 MW at a price of €0 into the order book. However, the TSOs' sell order is not fully cleared in the first batch. In this example, optimisation is applied to clear the secondary trading.

The order book for the first batch is shown in Table B-3. A service provider has submitted a buy order for 150 MW at -€12. However, optimisation will not process this order, as the sell order is listed at a price of zero in the order book.

Table B-3: Order book (Example 3-First Batch)

Service	Order	Divisibility	Price	Quantity [MW]	Accepted proportion	Traded volume [MW]	In merit where accepted?
POR-Dynamic	Buy	Non-divisible	-€12	150	0	0	N/A
POR-Dynamic	Buy	Divisible	€15	9	1	9	yes
POR-Dynamic	Buy	Non-divisible	€25	17	1	17	yes
POR-Dynamic	Buy	Divisible	€36	6	1	6	yes
POR-Dynamic	Buy	Non-divisible	€48	45	1	45	yes
POR-Dynamic	Buy	Divisible	€59	55	1	55	yes
POR-Dynamic	Buy	Non-divisible	€65	5	1	5	yes
POR-Dynamic	Buy	Non-divisible	€70	30	1	30	yes
POR-Dynamic	Sell	Divisible	0	500	0.334	167	yes

From the 500 MW offered in the TSOs' sell order, only 167 MW is successfully cleared at a price of €15, which is the lowest non-negative accepted buy order in the order book. The net price, applicable to all accepted buy orders in this batch, is determined by subtracting €15 from the Scarcity Price.

Suppose the gate closure time allows for additional batches to be processed for the same trading period in which the scarcity condition applies. Table B-4 below presents the order book for the second batch. Since 167 MW of the TSOs' sell order was cleared in the previous batch, the remaining 333 MW is carried over to this batch.

Table B-4: Order book (Example 3- Second Batch)

Service	Order	Divisibility	Price	Quantity [MW]	Accepted proportion	Traded volume [MW]	In merit where accepted?
POR-Dynamic	Buy	Non-divisible	-€15	150	0	0	N/A
POR-Dynamic	Buy	Divisible	€22	90	0	0	N/A
POR-Dynamic	Buy	Non-divisible	€29	35	0	0	N/A
POR-Dynamic	Buy	Divisible	€40	60	0	0	N/A
POR-Dynamic	Buy	Non-divisible	€50	145	1	145	No
POR-Dynamic	Buy	Divisible	€62	155	0.697	108	yes
POR-Dynamic	Buy	Non-divisible	€70	50	1	50	yes
POR-Dynamic	Buy	Non-divisible	€75	30	1	30	yes
POR-Dynamic	Sell	Divisible	0	333	1	333	yes

As shown in Table B-4, a total of 333 MW is cleared at a clearing price of €62, determined by the marginal, partially accepted buy bid of 155 MW at €62. However, a buy bid of 145 MW at €50 is paradoxically accepted. Since the highest accepted sell order is offered at €0, which is lower than the lowest accepted buy order, this corresponds to scenario C, as outlined in Section 6.3.4.6. In this situation, a potential price range for the Secondary Trading Clearing Price can be established. Additionally, the Secondary Trading Clearing Price is set as close as possible to the marginally accepted order. In this example, the valid range is [0,50], and the marginally accepted bid is on the buy side. Consequently, the Secondary Trading Clearing Price is set to €50.

For the remaining batches in this trading period, since the TSO sell order will no longer be in the order book, buy and sell orders can be submitted and cleared as they would under normal conditions.

14.3 Appendix C – Volume Insufficiency and Scarcity Pricing Examples

This section analyses various scenarios in which insufficient volumes may occur within the DASSA, potentially leading to TSOs implementing the Scarcity Price. This analysis is conducted by AFRY, aiming to provide comprehensive understanding of the factors that could influence market conditions.

Note: *The values provided are not representative of system requirements or system volume requirements. They are entirely made up and intended solely for illustrative purposes for the scenarios below.*

14.3.1 Example 1. Volume Insufficiency in a Higher Quality Subcategory Product

This scenario occurs when a higher-quality sub-category reserve product faces shortfall exceeding the corresponding Volume Insufficiency Threshold limit. This scenario can occur across various reserve products, each requiring a minimum volume for dynamic response.

Table C-1: Volume Insufficiency in a Higher Quality Subcategory Product

Total Volume POR Requirement [MW]	Min Requirement Dynamic POR [MW]	Available Dynamic POR [MW]	Bid Static POR [MW]	Volume Insufficiency Dynamic POR
1050	350	300	1000	50

This scenario occurs where a higher-quality subcategory reserve product experiences volume insufficiency which exceeds the tolerance permitted under the Reserve Scarcity Threshold. This situation may arise across multiple reserve categories, each of which is subject to a minimum volume requirement for dynamic reserve response.

In Table C-1 above, the POR product is used as an illustrative example. It assumes a total volume requirement of 1050 MW for POR reserve in a given DASSA trading period, with a minimum requirement of 350 MW for Dynamic POR response.

In this scenario:

- If only 300 MW of Dynamic POR response capacity is available,
- While 1000 MW of Static POR response capacity is bid into the DASSA.
- As a result, the market experiences a volume insufficiency of 50 MW for Dynamic POR response.

This example assumes that the defined Volume Insufficiency Threshold value for dynamic POR response is lower than the observed volume insufficiency.

While the total available capacity for POR response in the DASSA is 1300 MW, comprising both static and dynamic responses, the observed deficit arises from lower-quality static responses being unable to meet the requirements for higher-quality dynamic responses.

As a result:

- The TSOs will clear 700 MW of static POR response, based on the intersection of offered volumes and the portion of demand that can be met by static capacity.

- For dynamic POR response, as there is an insufficiency of available POR that exceeds the threshold, the TSOs will apply the volume insufficiency approach as outlined in Section 4.3.1.

To avoid ambiguity, it should be noted that in this scenario, the TSOs will, in secondary trading, exclusively procure POR from dynamic response providers to meet the dynamic requirements that were not met in the original DASSA auction.

14.3.2 Example 2. Volume Insufficiency in a Lower Quality Subcategory Product

As described by AFRY in Section 3.9.2 of their report, this scenario may occur similarly to the above one but with a noted volume insufficiency in the lower-quality response category product instead.

To illustrate this scenario, we consider the FFR product and its three sub-categories, along with the distinction between static and dynamic response types. Assume a total volume requirement of 1,050 MW for the FFR product, with minimum sub-category requirements and minimum dynamic response requirements per sub-category and corresponding available capacities during a DASSA Trading Period as outlined in Table C-2 below.

Table C-2: Volume Insufficiency in a Lower Quality Subcategory Product

Quality variations for FFR	Min. requirement constraints [MW, cumulative]	Capacities made available in the DASSA [MW, cumulative]
Total FFR response	**1050**	**1340**
Total Dynamic Response	840	890
Total Static Response	0	450
FFR Sub-category 1	**630**	**654**
Dynamic Response	504	504
Static Response	0	150
FFR Sub-category 2 or faster (i.e. cumulative with FFR Sub-category 1)	**735**	**790**
Dynamic Response	588	540
Static Response	0	250
Remaining volumes - can be provided by any provider (FFR sub cat 1, 2, i.e. any qualified provider able to provide response in <1s)	315	
FFR Sub-category 3		**1340**
Dynamic Response	0	280
Static Response	0	100

Note: The values shown in the table above are illustrative only and have been selected arbitrarily for this example. They do not reflect the actual volume constraints expected to be set in DASSA by the TSOs.

As per Table C-2 above the DASSA is unable to procure enough volume to meet the minimum dynamic requirement for FFR sub-category 2.
Only faster response sub-categories can substitute for slower ones. Therefore, if additional capacity had been available in dynamic FFR sub-category 1 (the faster response sub-category), it could have helped meet the sub-category 2 volume requirement.

However, only 504 MW of dynamic FFR sub-category 1 is available in the DASSA, which means there is no surplus capacity to cover the remaining 48 MW shortfall for sub-category 2.
Assuming the volume shortfall is greater than the Volume Insufficiency Threshold, the TSOs will apply scarcity pricing across both sub-categories 1 and 2, following the approach described in Section 4.3. 1. This means that the 48 MW shortfall in sub-category 2 can be met by providers from either sub-category 1 or 2.
This example illustrates an important principle: when a lower-quality sub-category faces a volume shortfall, scarcity pricing applies not only to that sub-category but also to all substitutable (higher-quality) sub-categories.
This aligns with the DASSA objective function design, which ensures that the clearing price for a higher-quality reserve product must always be equal to or greater than that of a lower-quality product. It also sends the right price signals within the DASSA and secondary trading markets, encouraging provision of higher-quality reserve responses, even when shortages occur in lower-quality categories.

14.3.3 Example 3. Jurisdictional Volume Insufficiency in Reserve Products

As outlined in the VFM consultation paper, TSOs will establish minimum volume requirements for each reserve products on a jurisdictional basis. There may arise instances where the reserve volumes available in the DASSA within a given jurisdiction fall short of the specified minimum requirements, resulting in a volume insufficiency that exceeds the permitted threshold.

To incentivise the availability of additional capacity in the jurisdiction experiencing the reserve volume insufficiency, a Scarcity Price will be implemented for the affected reserve product. It is important to note that the application of Scarcity Price will be limited to the reserve product provisioning within that specific jurisdiction.

The following example demonstrates a jurisdictional case for the POR product, with total minimum volume requirements set at 700 MW for ROI and 500 MW for NI.

In this scenario:

- The available dynamic POR volume in ROI is 1000 MW, which meets the dynamic POR requirement. As such, there is no volume insufficiency in ROI.
- In contrast, NI has only 400 MW of available dynamic POR, falling 100 MW short of the required volume — a deficit that exceeds the assumed applicable threshold of, for example, 50 MW.

As a result, the TSOs will implement a Scarcity Price for DASSA and secondary trading specific to the POR product in the NI jurisdiction only, as outlined in Section 4.3.1.

Table C-3: Jurisdictional Volume Insufficiency in Reserve Products

Jurisdiction	Min Dynamic POR Requirement	Available Dynamic POR (MW)	Volume insufficiency
ROI	700	1000	Not applicable
NI	500	400	100

14.3.4 Example 4. All Island Volume Insufficiency

As outlined in the scenarios previously presented by AFRY, a scenario may arise where the volume of a reserve product available in DASSA falls below the All-Island minimum volume requirement for that product.

If the insufficient volume exceeds the permitted tolerance defined by the Volume Insufficiency Threshold, the TSOs will apply the scarcity pricing mechanism to that reserve product on an All-Island basis — meaning it will affect both jurisdictions (ROI and NI).

Hypothetical Example:
Consider a case where the jurisdictional requirements for a reserve product (e.g., POR) are 700 MW for ROI and 500 MW for NI, with an All-Island requirement of 1,400 MW.

If the available volumes in DASSA match the jurisdictional needs — 700 MW in ROI and 500 MW in NI — then both jurisdictions individually meet their requirements. However, a 200 MW shortfall still exists at the All-Island level.

Assuming this 200 MW shortfall exceeds the applicable Volume Insufficiency Threshold, the TSOs will trigger scarcity pricing for the POR product across the All Island. In such a case, all procured volumes for that product will clear at the scarcity price.

Table C-4: All Island Volume Insufficiency

Jurisdiction	Min Requirement POR	Available POR	Volume Insufficiency
ROI	700	700	N/A
NI	500	500	N/A
All island	1400	1200	200