

Consultation on Procurement of Low Carbon Inertia Services (LCIS)

Contractual Arrangements

April 2023



Glossary of terms

Term	Definition
Connection Offer	means the offer letter issued to a Service Provider for a Connection Agreement
Connection Point	means the point where the LCIS Provider is connected to the Transmission System (110 kV or above)
ECP	means Enduring Connection Policy in Ireland (Enduring Connection Policy (eirgridgroup.com))
EDIL	means the TSOs' electronic dispatch instruction logger
LCIS	means the Low Carbon Inertia Service, including provision of Synchronous Inertia, Reactive Power support and Short-Circuit contribution, to be procured and delivered as part of this proposed procurement exercise
LCIS providers	means the units delivering the LCIS
MVA.s	means mega Volt-Ampere second (unit for inertia)
RES	means Renewable Energy Sources
Scalar	means a multiplier which adjusts the payment for a System Service to reflect the characteristics of the service delivery
SNSP	means System Non-Synchronous Penetration. It is a real-time measure of the percentage of generation that comes from non-synchronous sources, such as wind, solar and HVDC interconnector imports, relative to the system demand

Table 1: Glossary of terms

Executive Summary

In the SEM-21-021 Decision on the System Services Future Arrangements, the SEM Committee (SEMC) requested that the TSOs carry out an evaluation and bring forward proposals for a fixed term procurement in relation to Low Carbon Inertia Services (LCIS).

The TSOs' subsequently consulted on proposals for LCIS volumes to be procured, technical requirements and aspects of the commercial and procurement arrangements with a SEMC decision on these arrangements following in January 2023 in SEM-23-002.

This second TSO consultation paper now covers the proposed contractual arrangements governing the provision of LCIS and a number of areas relating to the design of the LCIS procurement process. This consultation paper should be read in conjunction with the following accompanying documents:

- proposed template for the Low Carbon Inertia Service Agreement between EirGrid and a service provider in Ireland;
- proposed template for the Low Carbon Inertia Service Agreement between SONI and a service provider in Northern Ireland;
- proposed Low Carbon Inertia Service Protocol which specifies the compliance requirements which a LCIS service provider must satisfy as well as the performance monitoring procedures that will be applied;
- AFRY Management Consulting report entitled 'Low Carbon Inertia Services (LCIS) - price cap and imbalance price proposals' dated April 2023.

These proposals are based on our consideration of the appropriate balance of system requirements, delivery timeframes, performance incentives and contractual arrangements to drive investment in LCIS for the overall benefit of the power system and consumers in Ireland and Northern Ireland.

In this consultation, we are seeking stakeholders' views on these proposals. SONI and EirGrid welcome feedback on the specific proposals outlined in this paper, which will be used to inform a recommendation paper that will be submitted to the SEMC for its consideration.

Note that proceeding with the resulting procurement process and awarding LCIS contracts is subject to approval of funding arrangements by the Regulatory Authorities.

Responses to the questions set out in this paper should be submitted through either the EirGrid or SONI consultation portal before 9 June 2023.

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1. Introduction and Background

1.1. Background

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

We have a responsibility to 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.

1.2. Shaping Our Electricity Future

In November 2021 we published the inaugural Shaping Our Electricity Future Roadmap¹ following consultation with stakeholders across society, government, industry, market participants and electricity consumers.

This Shaping Our Electricity Future Roadmap provides an outline of the key developments from a networks, engagement, operations and market perspective needed to support a secure transition to at least 70% renewables on the electricity grid (RES-E) by 2030². Inherent in this is a secure transition to 2030 whereby we continue to operate, develop and maintain a safe, secure, reliable, economical and efficient electricity transmission system.

A key action identified in this roadmap was the development of a process to procure Low Carbon Inertia Services (LCIS) that would support these RES-E objectives.



¹ https://www.eirgridgroup.com/site-files/library/EirGrid/Shaping_Our_Electricity_Future_Roadmap.pdf
https://www.soni.ltd.uk/media/documents/Shaping_Our_Electricity_Future_Roadmap.pdf

² RES-E targets were subsequently increased to 80%. Our SOEF Roadmap will be updated in 2023 to reflect this.

1.3. LCIS Procurement

In the SEM-21-021 Decision on the System Services Future Arrangements³, the SEM Committee (SEMC) requested that the TSOs carry out an evaluation and bring forward proposals for a fixed term procurement in relation to Low Carbon Inertia Services (LCIS). The motivation for this request is to support the integration of technologies which can facilitate a reduction in the quantity of carbon-intensive conventional generation required to run at any given time on the Ireland and Northern Ireland power systems. This reduction will facilitate the further integration of renewable generation and contribute towards achieving the 2030 Renewable Energy Source (RES) targets set in both Ireland and Northern Ireland.

In line with the SEMC Request, EirGrid and SONI developed a project plan which will ultimately provide fixed term contracts for LCIS (including inertia, reactive power and short circuit contribution capability).

In addition, in Ireland, the Climate Action Plan 2023⁴ (CAP23) launched by the Department of the Environment, Climate and Communication in December 2022 has set out ambitious actions in relation to LCIS.

1.4. Procurement Plan

In line with the SEMC request, EirGrid and SONI developed a project plan which will ultimately provide fixed term contracts for LCIS (including inertia, reactive power and short circuit contribution capability). The targeted date for completion of the procurement process and contract award is now planned for December 2023.

The overall procurement plan is provided in Table 2.

Description	Start Date	Finish Date
Detailed plan for the implementation of the project to be presented to the Industry (Completed - webinar held on 15 Dec. 2021)	Q4 2021	Q4 2021
Studies to identify the technical and locational requirements considering inertia, reactive power and short circuit level (Completed)	Q3 2021	May-22
Consultation, recommendation and SEMC decision on the procurement and requirements (Completed)	Jun-22	Jan-23
Consultation, recommendation and SEMC decision on the contractual arrangements (Ongoing)	Apr-23	Aug-23
Prequalification questionnaire (PQQ)	Jun-23	Aug-23
Request for Proposal (RfP)	Sep-23	Nov-23
Award of contracts	Dec-23	Dec-23

Table 2: Overall procurement process plan

³ [SEM-21-021 System Services Future Arrangements - Decision Paper 1 | SEM Committee](#)

⁴ [gov.ie - Climate Action Plan 2023 \(www.gov.ie\)](#)

Note that EirGrid and SONI believe that the timeline presented Table 2 can be achieved assuming that there will be no material delay on the finalisation and approval of the contractual arrangements and that the PQQ process can start before the SEMC Decision on the contractual arrangements.

Based on the plan presented in Table 1, the decision made in SEM-23-002 and the proposals made in this consultation paper, timelines/milestones post award of contract are expected to be as follows:

- In Ireland, commencement of the transmission connection offer process for LCIS devices (outside of the standard ECP process) in Q1 2024 (this is expected to follow the standard 90 business days process);
- The earliest LCIS Go-Live Date shall be the 1st of October 2024;
- The LCIS Target Go-Live Date shall be end of Q4 2026 (36 months after contract execution as proposed in Section 3.2 and subject to SEMC approval);
- All the LCIS contracts shall end in Q4 2032 (6 years after Target Go-Live Date).

1.5. Previous Consultation on Technical Requirements and Procurement Approach

From 23 June 2022 to 12 August 2022, EirGrid and SONI consulted stakeholders⁵ on the requirements and a range of design elements underpinning the LCIS procurement process.

On 14 November 2022, a recommendations paper was submitted to the Regulatory Authorities and the SEMC Decision (SEM-23-002) was taken on 11 January 2023⁶.

Figure 1 summarises our 2026 LCIS requirement for Northern Ireland and Ireland as well as the incentivised zones recommended by the TSOs and approved by the SEMC.

⁵ <https://consult.eirgrid.ie/consultation/consultation-low-carbon-inertia-service-lcis-competitive-procurement>
<https://consult.soni.ltd.uk/consultation/consultation-low-carbon-inertia-service-lcis-competitive-procurement-0>

⁶ <https://www.semcommittee.com/publications/sem-23-002-procurement-low-carbon-inertia-services-decision-paper>

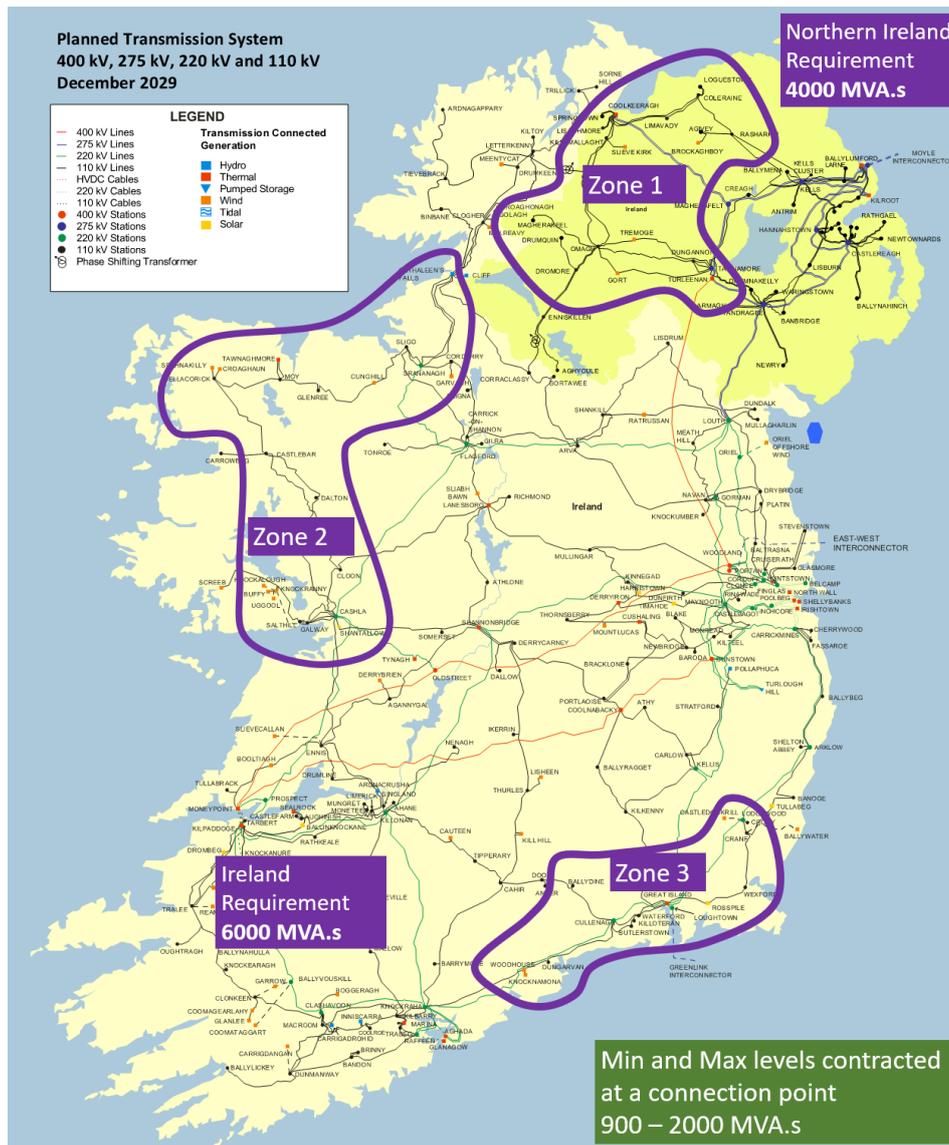


Figure 1: Zones incentivised and requirements (in MVA.s)

1.6. Purpose of this Consultation

The purpose of this paper is to consult on:

- the LCIS Agreement for the provision of LCIS;
- the LCIS Protocol which sets out the operational requirements and performance monitoring procedures, including the calculation of performance scalars;
- the price cap to be applied in the LCIS procurement process;
- a number of other items on the locational criteria, imbalance price to be used in the evaluation of losses, and contract execution deadline.

Questions are provided for which we request responses by **9 June 2023**.

1.7. Structure of this Paper

This consultation paper is structured as follows:

- Section 2 provides an overview of the LCIS contractual arrangements.
- Section 3 provides an overview of the contents of the LCIS Agreement.
- Section 4 provides an overview of the contents of the LCIS Protocol.
- Section 5 provides an overview of the proposals for which further consultation is required. This includes requirements relating to connection to the power system, contract execution, and the price cap.
- Section 6 provides a list of the consultation questions.
- Section 7 provides a summary of the next steps.

2. Structure of the Contractual Arrangements

The LCIS contractual arrangements will consist of an LCIS Agreement and an LCIS Protocol that LCIS providers will be party to.

Figure 2 provides an overview of the contractual arrangements.

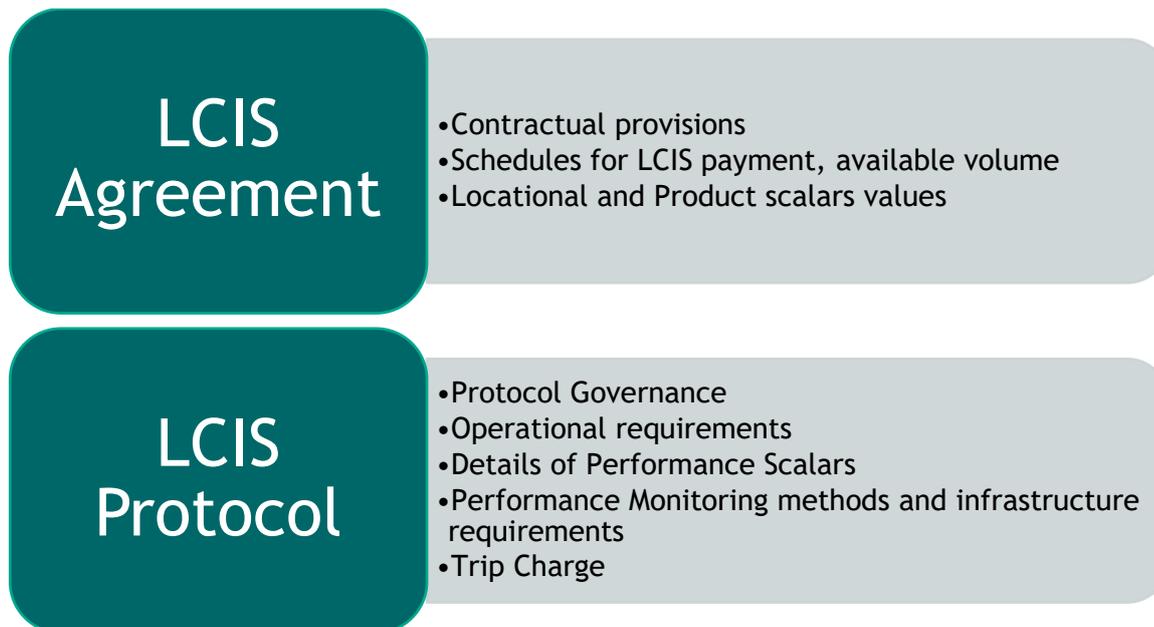


Figure 2: Overview of the LCIS contractual arrangements

2.1. LCIS Protocol Document

The LCIS Agreement will refer to a LCIS Protocol document. This LCIS Protocol document will specify the Performance Monitoring procedures to be applied, and how these in turn will impact remuneration via the use of Scalars. It will also contain a limited number of operational requirements, specifying minimum standards that Providing Units must meet. A single LCIS Protocol will apply to all LCIS providers.

We propose that the LCIS Protocol remain outside of the LCIS Agreement itself. This is to allow for the possibility of the testing and performance monitoring arrangements to be modified in future to address any unintended or unexpected outcomes associated with the provision of this new service. The separation of the Protocol document from the Agreement is consistent with the approach taken for DS3 System Services and other Fixed Term System Service contracts.

The Protocol will be a regulated document. Any proposed change to the Protocol document will be subject to industry consultation and changes will require approval of the Regulatory Authorities.

2.2. Jurisdictional arrangements

There will be two versions of the LCIS Agreement, one for Northern Ireland and one for Ireland. As TSOs, SONI will contract with service providers in Northern Ireland and EirGrid will contract with service providers in Ireland. These LCIS Agreements have been developed with the principle that arrangements will align as much as possible in both jurisdictions.

There will be a single, All-Island, LCIS Protocol document.

2.3. Proposed LCIS Agreement Structure

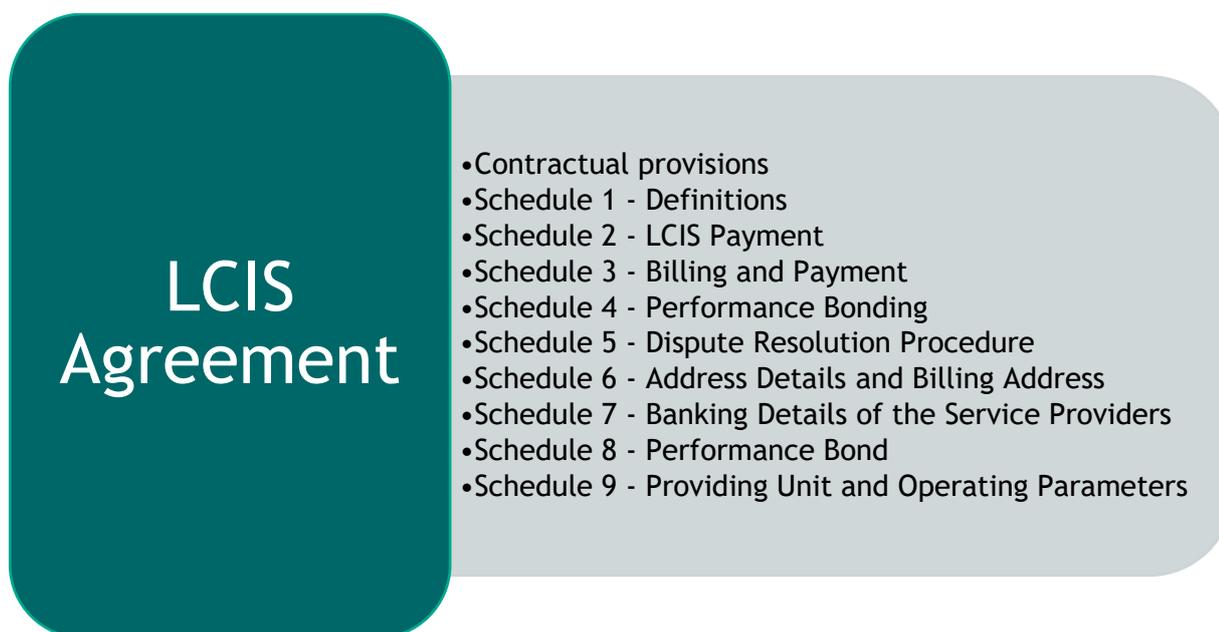


Figure 3: Overview of the LCIS Agreement structure

3. LCIS Agreement Overview

This section of the consultation provides a high-level summary of the proposed LCIS Agreement contents. The full Ireland and Northern Ireland versions of the LCIS Agreement are available on the consultation portals for review by parties wishing to respond to this consultation.

The Agreements have been drafted to provide for standard service provider arrangements in Ireland and Northern Ireland with the intention of aligning such arrangements as far as possible.

3.1. Definitions and Interpretation (Section 1 of Agreement)

Section 1 of the Agreement covers the general definitions (non-technical) and interpretations to be used throughout the contract.

3.2. Commencement and Duration of Agreement (Section 2 of Agreement)

This section outlines general provisions with respect to duration and purpose of the arrangements including contract length (i.e. 6 years from the Target Go-Live Date), rights on termination, as well as the necessary provision and availability of the service.

Note that we are making proposals in relation to the Target Go-live Date and participation in other system services arrangements.

TSOs' Proposal:

Extension of period between LCIS contract Effective Date and Target Go-Live Date:

We are proposing to extend the maximum period between the LCIS contract Effective Date and Target Go-Live Date from 33 months to 36 months. This will allow some additional time for project procurement and delivery given general pressures on supply chains. This extension does not prohibit projects connecting earlier and taking advantage of longer contract duration periods. This change will be subject to SEMC approval as the 33 months period was previously approved in SEMC Decision SEM-23-002.

TSOs' Proposal:

Clauses regarding other system services arrangements:

We are proposing in clause 2.7 of the LCIS Agreement that parties to the LCIS Agreement will be prohibited from the provision of other related System Services (i.e. Synchronous Inertial Response and Steady State Reactive Power) as these services overlap with the LCIS service procured which bundles the provision of Synchronous Inertia, Reactive Power support and Short-Circuit Contribution.

We are also proposing clause 2.8 in the LCIS Agreement to address the potential participation of LCIS providers in future System Services arrangements as required by SEMC Decision SEM-23-002.

Question 1: Do you have any comments on the extension of the period between LCIS contract Effective Date and the Target Go-Live Date from 33 months to 36 months?

Question 2: Do you have any comments on the clauses introduced regarding prohibition/participation in other System Services arrangements?

3.3. Provision and Purchase of the Low Carbon Inertia Service (Section 3 of Agreement)

This section outlines the duty of providers to deliver services in accordance with operating parameters and dispatch instructions, compliance obligations with respect to Grid Code, Trading & Settlement Code (TSC), and the Protocol. It also outlines provisions with respect to planned maintenance.

Note that a specific clause on Grid Code compliance has been introduced as the Grid Code modifications for LCIS devices might not be fully implemented by the contract execution date. In this event, appropriate Grid Code standards for Generating Units will be deemed applicable to LCIS units.

TSOs' Proposal:

Clause regarding Grid Code compliance:

We are proposing clauses 3.2.2 and 3.2.3 in the LCIS Agreement on Grid Code compliance as the Grid Code modifications for LCIS devices might not be fully implemented by the contract execution date. In this event, appropriate Grid Code standards for Generating Units will be deemed applicable to LCIS units.

Question 3: Do you have any comments on the clauses regarding Grid Code compliance?

3.4. Performance Security (Section 4 of Agreement)

This section outlines the principles of the Performance Bond which will be required prior to the date of contract execution, and the circumstances in which this bond will be payable. This section should be read in conjunction with Schedule 4, which outlines Performance Bonding Milestones and Schedule 8 which provides a draft on the Bonding agreement in full.

Question 4: Do you have any comments on the proposed Performance Security section?

3.5. Billing and Payment (Section 5 of Agreement)

This section outlines the payment which will be received for making available the service for which the provider is contracted, and the conditions for these payments.

3.6. Monitoring and Metering (Section 6 of Agreement)

This section includes provisions with respect to monitoring and metering of service providers.

3.7. Assignment (Section 7 of Agreement)

This section includes provisions with respect to assignment of rights and obligations under the contract.

3.8. Variations (Section 8 of Agreement)

This section includes provisions with respect to variations of the agreement.

3.9. Termination (Section 9 of Agreement)

This section includes provisions with respect to termination of the agreement.

3.10. Effect of Termination (Section 10 of Agreement)

This section covers rights and obligations on termination of the agreement.

3.11. Force Majeure (Section 11 of Agreement)

This section covers obligations and rights in cases of Force Majeure.

3.12. Limitation of Liability (Section 12 of Agreement)

This section covers limitations of liability for both parties in cases of breach of the agreement.

3.13. Confidentiality (Section 13 of Agreement)

This section includes provisions with respect to confidentiality.

3.14. Dispute Resolution (Section 14 of Agreement)

This section includes provisions in the case of disputes.

3.15. Miscellaneous (Section 15 of Agreement)

This section includes miscellaneous contractual provisions.

3.16. Governing Law and Jurisdictions (Section 16 of Agreement)

This section covers the governing law and jurisdictions.

Question 5: Do you have any comments on the remaining content of the main body of the LCIS Agreement?

3.17. SCHEDULE 1 Definitions

This schedule sets out definitions used in the contract including schedules.

3.18. SCHEDULE 2 Low Carbon Inertia Service

This schedule covers the payment mechanism for the provision of the Service.

Note that the Trading Period Payment will be based on the Available Volume of MVA.s only and that reactive power capability and short-circuit contribution are incentivised via the product scalars. There is no separate payment for the provision of reactive power and short-circuit contribution.

3.19. SCHEDULE 3 Billing and Payment Plan

This schedule provides an overview of the billing and payment mechanism for providing LCIS.

3.20. SCHEDULE 4 Performance Bonds

This schedule provides an overview of the Performance Bond milestones which will be used in the monitoring of projects from contract execution to the Go-Live date, and the information which will be

required from participants to fulfil their obligations for each milestone. The milestones correspond to stages in the construction and commissioning process and therefore the dates for each milestone will be specific to each project. It is also possible that some milestones will not be relevant for all providers, where projects are at a later stage of the connection process and have already passed a number of milestones.

3.21. SCHEDULE 5 Dispute Resolution Procedure

This schedule provides an overview of the procedure in the case of dispute between parties.

3.22. SCHEDULE 6 Addresses

This schedule details addresses of the contracted parties.

3.23. SCHEDULE 7 Banking Details

This schedule details banking information for the contracted parties.

3.24. SCHEDULE 8 Performance Bond

This schedule provides a template for the Performance Bond letter.

3.25. SCHEDULE 9 Providing Unit and Operating Parameters

This schedule provides an overview of the parameters that will need to be completed for each provider for their equipment.

Note that some of these parameters are based on those used for centrally dispatched generation units and might need to be amended by the time the Providing Unit will go-live to consider the most up to date arrangements regarding the Scheduling and Dispatch of the Providing Unit and associated Grid Code requirements.

Question 6: Do you have any comments with respect to the content of the Schedules of the LCIS Agreement?

4. LCIS Protocol Document

This section of the consultation document provides a high-level summary of the proposed LCIS Protocol and presents examples of the application of some of the scalars set out in the LCIS Protocol. The full Protocol is available on the consultation portals for review by parties wishing to respond to this consultation.

It is proposed that a single version of the Protocol will govern the LCIS arrangements in both Ireland and Northern Ireland.



Figure 4: Overview of the LCIS Protocol Document

4.1. Introduction (Section 1 of LCIS Protocol)

This section provides an introduction of the Protocol document.

4.2. Governance (Section 2 of LCIS Protocol)

This section outlines the framework under which any changes to the Protocol would be undertaken.

4.3. Operational Requirements (Section 3 of LCIS Protocol)

This section specifies the operational requirements that need to be satisfied by the Providing Unit.

4.4. Synchronisation Dispatch Performance Scalar (Section 4 of LCIS Protocol)

In our LCIS Requirements and Procurement Approach Recommendation Paper of 14 November 2022 we proposed developing a performance scalar to incentivise a Service Provider to synchronise in line with a dispatch instruction and that further details would be provided in the contractual arrangements consultation.

In Section 4 of the Protocol document, we have introduced a Synchronisation Dispatch Performance Scalar based on the number of failures (either a failure to synchronise or a failure to synchronise within a specified time tolerance) to follow a request to synchronise.

Note that the proposed approach to calculate this scalar is largely based on the existing methodology set out in the DS3 System Services Protocol to calculate a Performance Incident Response Factor.

For the Synchronisation Dispatch Performance Scalar, the formula has been condensed and adapted to be applicable to a Providing Unit which could be composed of several individual units behind a single connection point.

Sections 4.4.1 and 4.4.2 provide application examples. Note that the values used in the examples are for illustration purposes only. An extract from the Protocol is provided below to facilitate the comprehension of the example.

Extract from the Protocol:

[...] a Synchronisation Dispatch Performance Scalar (P_D) value between 1 and 0 will be calculated on a monthly basis (where values less than 1 will result in reduced payment) to incentivise the Providing Unit to synchronise on time. The value P_D will be calculated based on the data of the last 6 months as follows:

$$P_D = \left(\sum_{m=M-5}^{M-1} \left[\frac{\sum_{i=1}^N \left(1 - \frac{\text{Number of Failures of } u_i}{\text{Number of Instructions of } u_i} \right)_m}{N} \times V_m \right] \right) \times \frac{1}{3}$$

The Dynamic Time Scaling Factor (V_m) is calculated as illustrated below.

Number of Months between the Dispatch Instructions Month and Scalar Assessment 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
M-5+	0

4.4.1. Worked Example 1 for Synchronisation Dispatch Scalar

In the following example we show how the scalar would be calculated for different months.

Below we present an example of a number of synchronisation Instructions and failures to comply with these instructions. The example assumes a go-live date of 1st of April for the Providing Unit with the example running until 30th November of that year. During the first operational month the unit fails to synchronise 3 times and fails again once in June.

When the Scalar Assessment Month, M, refers to April then the Synchronisation Performance Dispatch Scalar, P_D, is calculated to be 0.9. For M=April, months M-1, M-2 etc. are assumed to have a number of failures equal to zero as there is no operational data.

For M=May, the number of failures is zero, however, the 3 failures over April will still impact the calculation of the scalar with less weight which results in a scalar of 0.92.

For M=June, where one failure occurs, the P_D drops again to 0.907 and then gradually increases to 1.0 in the following months given that no further failures occur.

Month	No. of Instructions	No. of failures	Synchronisation Dispatch Performance Scalar (P _d) for M=month
January	n/a	n/a	n/a
February	n/a	n/a	n/a
March	n/a	n/a	n/a
April (Go-live Date)	10	3	0.900 = $0.7 * \frac{V_m = 1}{3} + 1 * \frac{V_{M-1} = 0.8}{3} + 1 * \frac{V_{M-2} = 0.6}{3} + 1 * \frac{V_{M-3} = 0.4}{3} + 1 * \frac{V_{M-4} = 0.2}{3}$
May	10	0	0.920 = $1 * \frac{V_m = 1}{3} + 0.7 * \frac{V_{M-1} = 0.8}{3} + 1 * \frac{V_{M-2} = 0.6}{3} + 1 * \frac{V_{M-3} = 0.4}{3} + 1 * \frac{V_{M-4} = 0.2}{3}$
June	10	1	0.907 = $0.9 * \frac{V_m = 1}{3} + 1 * \frac{V_{M-1} = 0.8}{3} + 0.7 * \frac{V_{M-2} = 0.6}{3} + 1 * \frac{V_{M-3} = 0.4}{3} + 1 * \frac{V_{M-4} = 0.2}{3}$
July	10	0	0.933 = $1 * \frac{V_m = 1}{3} + 0.9 * \frac{V_{M-1} = 0.8}{3} + 1 * \frac{V_{M-2} = 0.6}{3} + 0.7 * \frac{V_{M-3} = 0.4}{3} + 1 * \frac{V_{M-4} = 0.2}{3}$
August	10	0	0.960 = $1 * \frac{V_m = 1}{3} + 1 * \frac{V_{M-1} = 0.8}{3} + 0.9 * \frac{V_{M-2} = 0.6}{3} + 1 * \frac{V_{M-3} = 0.4}{3} + 0.7 * \frac{V_{M-4} = 0.2}{3}$
September	10	0	0.987 = $1 * \frac{V_m = 1}{3} + 1 * \frac{V_{M-1} = 0.8}{3} + 1 * \frac{V_{M-2} = 0.6}{3} + 0.9 * \frac{V_{M-3} = 0.4}{3} + 1 * \frac{V_{M-4} = 0.2}{3}$
October	10	0	0.993 = $1 * \frac{V_m = 1}{3} + 1 * \frac{V_{M-1} = 0.8}{3} + 1 * \frac{V_{M-2} = 0.6}{3} + 1 * \frac{V_{M-3} = 0.4}{3} + 0.9 * \frac{V_{M-4} = 0.2}{3}$
November	10	0	1.000 = $1 * \frac{V_m = 1}{3} + 1 * \frac{V_{M-1} = 0.8}{3} + 1 * \frac{V_{M-2} = 0.6}{3} + 1 * \frac{V_{M-3} = 0.4}{3} + 1 * \frac{V_{M-4} = 0.2}{3}$

Table 3: Synchronisation Dispatch Performance application example 1

4.4.2. Worked Example 2 for Synchronisation Dispatch Scalar

In the following example we show how the scalar would be calculated when a Providing Unit comprises two individual units (u_1, u_2) for two sample cases:

- Case 1, both Individual Units achieve synchronisation at all requests from May to August but during September both Individual Units fail to synchronise three times. As per the previous example the Synchronisation Dispatch Performance Scalar is equal to 0.9.
- Case 2, both Individual Units achieve synchronisation at all requests of months May to August but during September Unit 1 fails three times and Unit 2 is not requested to synchronise. The Synchronisation Dispatch Performance Scalar is now 0.95.

Case 1

Month	Individual Unit 1		Individual Unit 2		Providing Unit
	No. of Instructions	No. of failures	No. of Instructions	No. of failures	Synchronisation Dispatch Performance Scar (P_d) for M=September
May	10	0	10	0	
June	10	0	10	0	
July	10	0	10	0	
August	10	0	10	0	
September	10	3	10	3	

Table 4: Synchronisation Dispatch Performance example 2 (case 1)

Case 2

Month	Individual Unit 1		Individual Unit 2		Providing Unit
	No. of Requests	No. of failures	No. of Requests	No. of failures	Synchronisation Dispatch Performance Scar (P_d) for M=September
May	10	0	10	0	
June	10	0	10	0	
July	10	0	10	0	
August	10	0	10	0	
September	10	3	0	0	

Table 5: Synchronisation Dispatch Performance example 2 (case 2)

4.5. Reactive Power Product Scalar (Section 5 of LCIS Protocol)

In our LCIS Requirements and Procurement Approach Recommendation Paper of 14 November 2022, we proposed developing a performance scalar related to reactive power provision as part of this consultation on contractual arrangements. In addition, we proposed to introduce a reactive power product scalar for a Providing Unit with enhanced capability (see SEM-23-002 Appendix 1).

We considered implementing a performance scalar based on the response of a Providing Unit to a reactive power dispatch instruction but concluded that this would be complex and challenging to implement in the required timeframe. We now propose a product scalar based on the declared reactive power capability of the Providing Unit.

Note that this scalar will be determined on a continuous basis according to the declared reactive power capability of the Providing Unit (see Section 5 of the LCIS Protocol). This reactive power scalar will:

- incentivise reactive power capability above the enhanced reactive power capability thresholds;
- penalise reactive power capability under the minimum reactive power capability requirements.

Note that the minimum requirement and the enhanced thresholds for reactive power were defined in our LCIS Requirements and Procurement Approach Recommendation Paper of 14 November 2022 as follows:

Technical Requirement at the connection point	Range required	Product scalars
Reactive Power (MVAR)	Lagging min 0.8 p.u.*	≥ 0.9 p.u. → Scalar 1.05 $\geq 0.8 < 0.9$ p.u. → Scalar 1.0
	Leading min -0.4 p.u.*	≤ -0.6 p.u. → Scalar 1.05 $\leq -0.4 > -0.6$ p.u. → Scalar 1.0
* per unit of rating in MVA		

Section 4.5.1 provides an application example. Note that the values used in the example are for illustration purposes only. An extract from the Protocol is provided below to facilitate the comprehension of the example.

Extract from the Protocol:

The Reactive Power Product Scalar can take a value between 1.1025 and 0.81 and will be calculated for each calendar month, as follows:

$$\text{Reactive Power Product Scalar} = \text{Lagging Scalar} * \text{Leading Scalar}$$

Where:

$$\text{Lagging Scalar} = \begin{cases} 1.05 & \text{Declared Unit}_{lagging} \geq 0.9 \\ 1.0 & 0.8 \leq \text{Declared Unit}_{lagging} < 0.9 \\ 0.125 * \text{Declared Unit}_{lagging} + 0.9 & \text{Declared Unit}_{lagging} < 0.8 \end{cases}$$

$$\text{Leading Scalar} = \begin{cases} 1.05 & \text{Declared Unit}_{leading} \leq -0.6 \\ 1.0 & -0.6 < \text{Declared Unit}_{leading} \leq -0.4 \\ -0.25 * \text{Declared Unit}_{leading} + 0.9 & \text{Declared Unit}_{leading} > -0.4 \end{cases}$$

Where:

$$\text{Declared Unit}_{lagging} = \text{Declared MVAR}_{lagging} / \text{Base MVA}$$

$$\text{Declared Unit}_{leading} = \text{Declared MVAR}_{leading} / \text{Base MVA}$$

4.5.1. Worked Example for Reactive Power Product Scalar

In the following example we show how the reactive power scalar would be calculated for three cases:

- Case 1: the Providing Unit declares reactive power capability above the enhanced thresholds 100% of the time within the month;
- Case 2: the Providing Unit declares zero reactive power capability 100% of the time within the month;
- Case 3: the Providing Unit declares reactive power capability above the enhanced thresholds 20% of the time, above the minimum requirements but below the enhanced thresholds 30% of the time and declares zero capability the remaining 50% of the time.

Case 1

% of time within the month	Declared Unit (lagging)	Declared Unit (leading)
100%	0.95	-0.65
Average	0.95	-0.65
Lagging and Leading scalars	1.05	1.05
Reactive Power Product Scalar	1.1025	

Table 6: Reactive Power Product Scalar application example (case 1)

Case 2

% of time within the month	Declared Unit (lagging)	Declared Unit (leading)
100%	0	0
Average	0	0
Lagging and Leading scalars	0.9	0.9
Reactive Power Product Scalar	0.81	

Table 7: Reactive Power Product Scalar application example (case 2)

Case 3

% of time within the month	Declared Unit (lagging)	Declared Unit (leading)
20%	0.95	-0.65
30%	0.80	-0.50
50%	0	0
Average	0.43	-0.28
Lagging and Leading scalars	0.953	0.97
Reactive Power Product Scalar	0.92	

Table 8: Reactive Power Product Scalar application example (case 3)

4.6. Availability Performance Scalar (Section 6 of LCIS Protocol)

In our LCIS Requirements and Procurement Approach Recommendation Paper of 14 November 2022, an Availability Performance Scalar was proposed and subsequently approved by SEMC in Decision SEM-23-002.

Section 6 of the Protocol sets out how the availability performance scalar shall be calculated.

Section 4.6.1 provides an application example. Note that the values used in the example are for illustration purposes only. An extract from the Protocol is provided below to facilitate comprehension of the example.

Extract of the Protocol:

The value of the Availability Performance Scalar will be determined based on the Availability Factor as per the table below:

Availability Factor	Availability Performance Scalar
<60%	0
≥60% <70%	0.25
≥70% <80%	0.50
≥80% <90%	0.70
≥90% <95%	0.85
≥95% <97%	0.95
≥97%	1.00

The Availability Factor will be calculated for each calendar month and will apply to all payments in that month. It will be based on the Available Volume versus the Contracted Volume considered over a period of 12 months, with each month given an equal weighting (month M to month M-11).

The Availability Factor for each month will be then calculated as follows:

$$\text{Availability Factor} = \sum_{m=M}^{M-11} \left(\frac{(\text{Available Volume})_m}{(\text{Contracted Volume})_m} * 1/12 \right) * 100\%$$

4.6.1. Worked Example for Availability Performance Scalar

In the following example we show how the Availability Factor and corresponding Availability Performance Scalar would be calculated.

The Table below presents the ratio of Available Volume to Contracted Volume for the first 13 months since the go-live date. Note that we have no operational data before the go-live date.

During the first month the Providing Unit was available only a quarter of the time, which means that the Available Volume to Contracted Volume ratio is 0.25 in January. Considering that the Availability Factor is calculated based on the rolling twelve-month average, the Available to Contracted Volume ratio is set to

one for the previous 11 months as we have no operational data before the Go-Live Date. As a result, the Availability Factor for M-January to December is equal to 93.75% and the resulting Availability Performance scalar equal to 0.85. On the 13th month the Availability Factor is 100% and the Availability Performance Scalar is equal to 1.

Month	Available Volume / Contracted Volume	Availability Factor for M=month	Availability performance Scalar for M=month
January (Go-live on 1st January)	0.25	93.75%	0.85
February	1	93.75%	0.85
March	1	93.75%	0.85
April	1	93.75%	0.85
May	1	93.75%	0.85
June	1	93.75%	0.85
July	1	93.75%	0.85
August	1	93.75%	0.85
September	1	93.75%	0.85
October	1	93.75%	0.85
November	1	93.75%	0.85
December	1	93.75%	0.85
January	1	100%	1

Table 9: Availability Performance Scalar application example

4.7. Consumption Performance Scalar (Section 7 of LCIS Protocol)

The SEMC Decision (SEM-23-002) on our LCIS Requirements and Procurement Approach Recommendation Paper of 14 November 2022 required the following *“When developing contractual arrangements, the TSOs, subject to RA approval, will develop a mechanism to penalise under-performance on declared energy consumption such that consumers are not exposed financially to the risk of higher consumption than what is declared at tender stage.”*

Section 7 of the Protocol introduces an LCIS Unit energy Consumption Performance Scalar to penalise if the actual energy consumption of the LCIS Unit is above the contracted energy consumption for the reference operating conditions. The contracted energy consumption values will be as submitted at the LCIS tendering stage as they will be used in the tender evaluation process.

4.8. Trip Charge (Section 8 of LCIS Protocol)

In our LCIS Requirements and Procurement Approach Recommendation Paper of 14 November 2022, we proposed to incentivise a Service Provider to reliably deliver the service in steady state and during system frequency/voltage events (i.e. that it does not trip) and that further detail would be provided in the contractual arrangements.

In Section 8 of the LCIS Protocol document, we have introduced a trip charge that will apply if an LCIS unit trips using the EDIL 'Trip' instruction functionality. A monthly trip charge, which will be the sum of each individual trip charge that month, will be calculated every month and will be netted off any other monthly Payments owed to the Service Provider under the LCIS Agreement.

4.9. Performance Monitoring Timeline and Business Process Overview (Section 9 of LCIS Protocol)

This section outlines the performance monitoring timeline and business process.

Question 7: Do you have any comments with respect to the Scalars (Synchronisation Dispatch Performance, Reactive Power Product, Availability Performance, Consumption Performance) and Trip Charge proposed?

Question 8: Do you have any comments on the remaining content of the LCIS Protocol?

5. LCIS Procurement design

5.1. Introduction

This section sets out a number of additional TSO proposals related the LCIS procurement process. These proposals reflect the TSOs’ latest consideration of some aspects of the procurement process and the specific requests that were made by the SEMC in their decision on the Requirements and Procurement Approach⁷.

Table 10 provides an overview of the proposals contained in Section 5.

Section	Topic	TSOs’ Proposals
5.2	Planning Permission as pre-requisite (additional detail)	<p>The requirement for Planning Permission to be granted as a pre-requisite at the RfP stage was determined in SEM-23-002. We are now seeking feedback on an additional proposal to provide more detail on what is expected.</p> <p>A planning reference number and a plan of the facility will need to be provided by the tenderer at RfP stage. The TSOs’ evaluation team will check that planning is granted (with or without conditions) and that the plan includes the main equipment of the facility, including a step-up transformer.</p>
5.3	Locational criteria	<p>Modified locational quantity criteria:</p> <p>Criterion 1: The limit of no more than 2000 MVA.s of LCIS service capability contracted at a transmission station will include any contribution from LCIS devices directly fed into that transmission station from ‘tail-fed’ transmission stations.</p> <p>Criterion 2: Where offered, a minimum of 900 MVA.s of LCIS service will be procured in each of the three incentivised zones. If no LCIS service is offered in a zone(s), we will still aim to procure the jurisdictional targeted volume from LCIS services offered outside of the zone(s).</p>
5.4	Price cap / bid caps (SEMC request)	<p>The price cap will be set to €2.02/MVA.s per hour in Ireland and £1.79/MVA.s per hour in Northern Ireland. Tenderers bids should account for the application of scalars so that their resulting payment does not exceed this price cap. The proposed price cap, the assumptions underpinning it and the analysis set out in the AFRY Management Consulting report more generally, are still subject to review by the Regulatory Authorities. We will be engaging with the Regulatory Authorities on this analysis during the consultation period.</p>
5.5	Imbalance price for cost of energy	<p>The imbalance price proposed for the purpose of factoring in the cost of imported energy into the procurement evaluation is €97/MWh or £85.8/MWh.</p>

⁷ <https://www.semcommittee.com/publications/sem-23-002-procurement-low-carbon-inertia-services-decision-paper>

Section	Topic	TSOs' Proposals
5.6	Contract execution and connection offer	Preferred bidders must sign the LCIS Agreement 20 business days after TSOs' notifications in both jurisdictions. In Ireland, once the contract is signed, providers will be eligible to enter the grid connection offer process outside of the ECP process by direction from CRU.

Table 10: Overview of TSOs' proposals on the procurement design

5.2. Planning permission

Following our recommendations paper, the SEMC Decision sets out that “Full planning permission is required for tender submission (after pre-qualification) in both jurisdictions.” We are now seeking feedback on an additional proposal providing more detail on what is expected.

At the Request for Proposal (RfP) stage, the planning reference number will need to be provided and the evaluation team will check that planning has been granted and that it includes the main equipment of the facility, including a step-up transformer.

The connection assets connecting the facility of the Service Provider to the existing meshed transmission system will not be evaluated at RfP stage as the connection method might not be confirmed yet at this stage. However, it may be included by the tenderer at early stage to speed up the delivery of the connection assets and ultimately the delivery of LCIS.

Note that in Ireland, the Policy Statement on Options for Connecting Customers to the Transmission Network⁸ provides the possible connection methods. In particular we wish to highlight the distinction made in this Policy between connections that require a new ‘tail-fed’ transmission station to be built to facilitate the connection to an existing transmission station (e.g. Option 2) and direct connections ‘over or under the fence’ to an existing transmission station (Option 4). The latter (Option 4) is only applicable where a customer’s proposed facility is directly adjacent to an existing transmission substation.

TSOs' Proposal:

The requirement for Planning Permission to be granted as a pre-requisite at the RfP stage was determined in SEM-23-002. We are now seeking feedback on an additional proposal to provide more detail on what is expected.

Additional proposal:

A planning reference number and a plan of the facility will need to be provided by the tenderer at RfP stage. The TSOs' evaluation team will check that planning is granted (with or without conditions) and that the plan includes the main equipment of the facility, including a step-up transformer.

Question 9: Do you have any comments on the additional clarification proposed regarding planning permission requirement?

⁸ [EirGrid Group Policies: Options for Connecting Customers to the Transmission Network](#)

5.3. Locational criteria

5.3.1. Limit on LCIS service volume contracted at a single transmission station

Following our recommendations, the SEMC Decision (SEM-23-002) sets out that “no more than 2000 MVA.s at a single transmission station will be contracted”.

We believe that this restriction needs to be clarified as our intention is to limit the total LCIS service capacity directly feeding into an existing meshed transmission station. For example, in the case where there are individual or multiple LCIS units connecting via tail-fed transmission connections to a meshed transmission station, the combined LCIS unit capacity will be limited to 2000 MVA.s. This limit would also include any LCIS unit directly connected at the meshed transmission system. (see Figure 5 below).

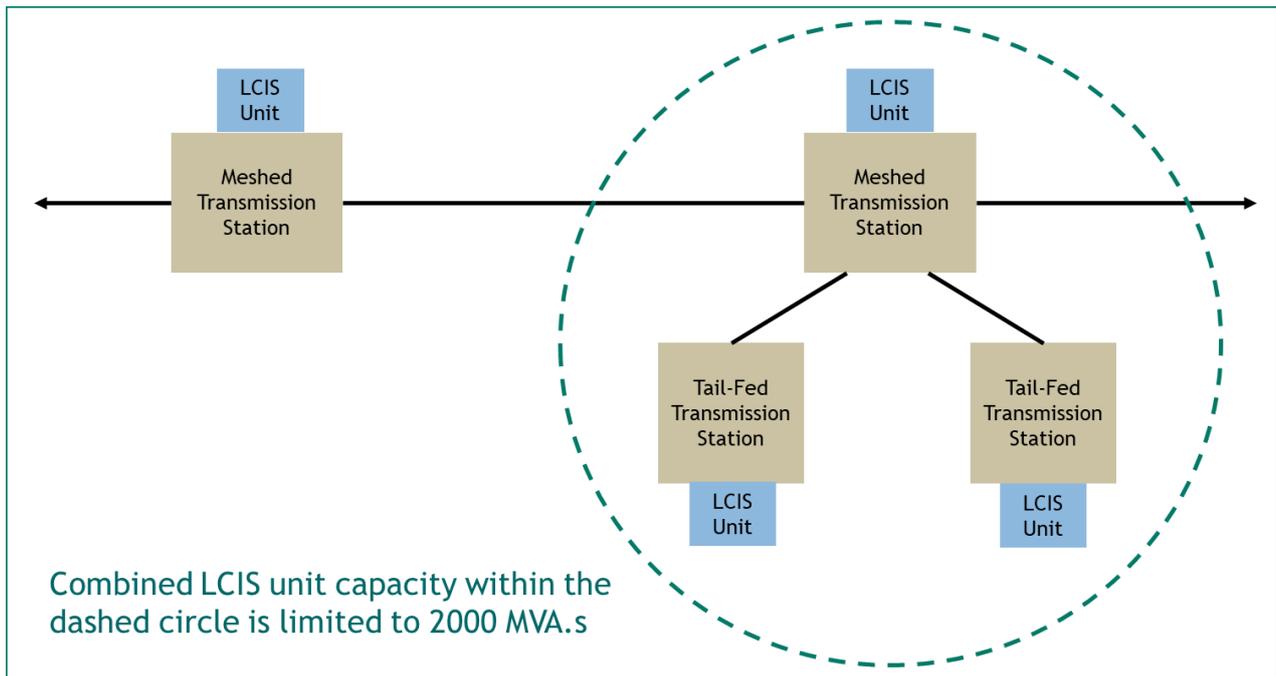


Figure 5: Illustration of application of the 2000 MVA.s limit contracted at a single transmission station

TSOs' Proposal:

Modified locational quantity criteria:

Criterion 1:

The limit of no more than 2000 MVA.s of LCIS service capability contracted at a transmission station will include any contribution from LCIS devices directly fed into that transmission station from 'tail-fed' transmission stations.

5.3.2. Minimum Zonal LCIS Service Volume Requirement

Regarding the LCIS service volume and location, the SEMC Decision (SEM-23-002) sets out that: “A targeted volume of 4000 MVA.s in Northern Ireland and 6000 MVA.s in Ireland shall be procured in Phase 1. Three

zones have been defined in which the placement of LCIS shall be incentivised. Potential LCIS providers located outside of the three incentivised zones can still participate in the procurement process.”

The zonal aspect of this decision was based on our technical studies which indicated that the location of LCIS services in these zones provided the greatest technical benefit. The development of locational scalars seeks to incentivise LCIS services locating in these zones however this outcome is not guaranteed.

While the location of LCIS services outside of the incentivised zones will still bring system benefits, there is a risk if LCIS services do not locate in the incentivised zones that the outcome of the procurement will

TSOs' Proposal:

Modified locational quantity criteria:

Criterion 2: Where offered, a minimum of 900 MVA.s of LCIS service will be procured in each of the three incentivised zones. If no LCIS service is offered in a zone(s), we will still aim to procure the jurisdictional targeted volume from LCIS services offered outside of the zone(s).

not deliver the level of benefits expected. In order to reduce this risk, we propose introducing an additional locational criterion to require a minimum of 900 MVA.s of LCIS services in each of the three incentivised zones (see criterion 2 below).

Question 10: Do you have any comments on the modified locational quantity criteria?

5.4. Price Cap

The SEMC Decision sets out regarding the bid format “*Bidding a price for LCIS in €/MVA.s per hour or £/MVA.s per hour. When developing the contractual arrangements, the TSOs will develop proposals for bid caps on providers' potential bids.*”

Subsequent to this decision we worked with AFRY Management Consulting to consider options and develop a proposal for setting a price cap for the LCIS service. The report setting out these considerations and our proposal is published alongside this consultation.

Based on this report we propose a price cap of €2.02/MVA.s per hour in Ireland and £1.79/MVA.s per hour in Northern Ireland. The proposed price cap, the assumptions underpinning it and the analysis set out in the AFRY Management Consulting report more generally, are still subject to review by the Regulatory Authorities. We will be engaging with the Regulatory Authorities on this analysis during the consultation period.

In addition, the Regulatory Authorities have requested that the TSOs, in conjunction with the Regulatory Authorities, undertake market concentration analysis to assess the levels of competition for the provision of LCIS, within the SEM and within the specified Northern Ireland and Ireland zones. The Regulatory Authorities have requested that this be completed prior to the publication of the TSOs' Recommendation paper and the SEMC decision paper on the contractual arrangements.

This price cap essentially sets a cap on the payment rate for the LCIS service. To remain within this payment rate cap, LCIS bid prices (the €/MVA.s per hour or £/MVA.s per hour price submitted at the tender stage) will need to account for the impact of product scalars and the locational scalar. These scalars, which can have combined values in the range 1.0 to 1.9, are multipliers on the bid price.

Product scalars are a function of the technical characteristics of the LCIS device reflecting its (actual or specified) inertia, short circuit contribution and reactive power capability (see section 5.4.3 of the TSOs Recommendation Paper in Appendix of the SEM-23-002). The Locational scalar is a function of the actual or proposed location of the LCIS device (see section 5.4.3 of the TSOs Recommendation Paper in Appendix

of the SEM-23-002). Both Product Scalars and the Locational Scalar will be known at the tendering stage so tenderers will be able to account for these when setting their LCIS bid price.

Bids that result in payment rates above the price cap will be rejected.

Examples:

Bidder	Bid submitted (€/MVA.s/h)	Product and Locational Scalars achievable	Scaled bid (€/MVA.s/h)	Price cap €2.02/MVA.s/h
Bidder 1	€1.2	1.8	€2.25	Above price cap, rejected
Bidder 2	€1.4	1.2	€1.68	Under cap

TSOs' Proposal:

The price cap to be used in the LCIS tender evaluation process will be €2.02/MVA.s per hour in Ireland and £1.79/MVA.s per hour in Northern Ireland. Tenderers should account for the impact of Product Scalars and Locational Scalar in determining their LCIS bid price to avoid exceeding this price cap. Bids that result in payment rates above the price cap will be rejected. The proposed price cap, the assumptions underpinning it and the analysis set out in the AFRY Management Consulting report more generally, are still subject to review by the Regulatory Authorities. We will be engaging with the Regulatory Authorities on this analysis during the consultation period.

Question 11: Do you have any comments on the proposed approach for the price cap?

5.5. Imbalance Price

The SEMC Decision sets out that *“Cost of imported energy will be factored into the evaluation. It will be converted to a cost per MVA.s per hour and added to the bid received.”*

For determining the imbalance price that will be used to determine the cost of imported energy in the tender evaluation process, we have worked with AFRY Management Consulting to consider options and develop a proposal for setting a price for this energy consumption. The report setting out these considerations and our proposal is published alongside this consultation.

Based on this report we propose an Imbalance price of €97/MWh or £85.8/MWh (assuming a real GB/EUR exchange rate of 1.13).

Note that this price will only be used for the purposes of the tender evaluation to account for the relative efficiency of the offered LCIS devices. The actual cost of energy consumption by LCIS devices will be managed separately under SEM arrangements.

TSOs' Proposal:

The imbalance price to be used for the purpose of factoring the cost of imported energy into the tender evaluation is €97/MWh in Ireland and £85.8/MWh in Northern Ireland.

Question 12: Do you have any comments on the proposed imbalance prices to be used in the LCIS tender evaluation process?

5.6. Procurement Process and Contract Execution

The SEMC Decision sets out that “Tenderers will go through a pre-qualification stage. Tenderers that make it through the pre-qualification stage will then receive a Request for Proposal and successful tenderers will be selected based on the cost per MVA.s / h.”

In addition the SEMC Decision sets out that “In Ireland, successful LCIS tenderers who do not have a connection offer will need to be prioritised outside of the Enduring Connection Policy (ECP) process by direction from the Commission for Regulation of Utilities (CRU).”

As part of this consultation, we would like to clarify the steps that will follow the Request for Proposal (RfP) stage. Following the RfP evaluation, the TSOs will identify a list of preferred bidders and will send them a notification of ‘preferred bidder status’. Following this notification, we propose to allow 20 business days for the preferred bidders to execute their contract.

We are proposing this relatively short period for contract execution on the basis that:

- The LCIS Contractual Arrangements will be available in advance of the tendering process (the proposed Agreement and Protocol are being consulted on as part of this consultation) and will be approved by the Regulatory Authorities. This should reduce the timeframe for contract review;
- As the LCIS Contractual Arrangements will operate on a ‘pay as bid’ basis, tenderers will be aware of the potential value of their contract in advance of the procurement;
- In Ireland, contract execution will allow us to expedite the LCIS grid connection offers that need to be prioritised outside of the ECP process per CRU direction (In Northern Ireland, connection offers may be processed at any time);
- It better facilitates the ability of tenderers who were initially not included in the preferred bidders list to be subsequently added to this list in a short timeframe should original preferred bidders drop out of the process;
- This will incentivise tenderers to be at a more advanced stage of readiness to progress their projects resulting in quicker delivery of the benefits that LCIS services will bring to the power system.

Another option where the grid connection offers would be processed to the preferred bidders prior to contract execution has been considered. However, such an approach could extend for many months the outcome of the procurement process and increase the number of grid connection offers processed outside of the ECP if the preferred bidders declined the grid connection offer received and pull out before contract execution (we would then need to go to the next preferred bidders and propose a connection offer as well before signature).

Error! Reference source not found. provides an overview of the procurement process, contract execution deadline and grid connection offer timeline in Ireland.

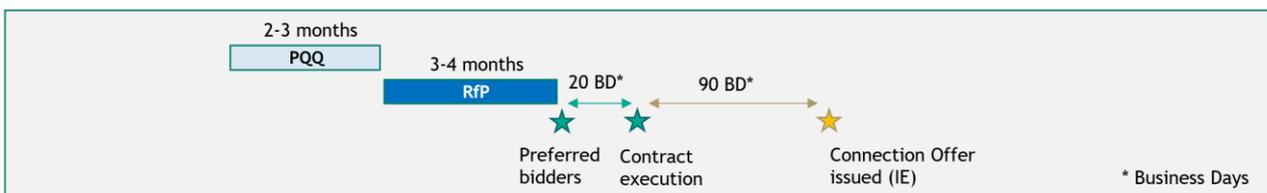


Figure 6: Procurement process and contract execution overview

Question 13: Do you have any comments on the proposed contract execution deadline and the fact that, in Ireland, grid connection offer will be processed following contract execution?

6. Next steps

6.1. Summary of Consultation Questions

Question 1: Do you have any comments on the extension of the period between LCIS contract Effective Date and the Target Go-Live Date from 33 months to 36 months?

Question 2: Do you have any comments on the clauses introduced regarding prohibition/participation in other System Services arrangements?

Question 3: Do you have any comments on the clauses regarding Grid Code compliance?

Question 4: Do you have any comments on the proposed Performance Security section?

Question 5: Do you have any comments on the remaining content of the main body of the LCIS Agreement?

Question 6: Do you have any comments with respect to the content of the Schedules of the LCIS Agreement?

Question 7: Do you have any comments with respect to the Scalars (Synchronisation Dispatch Performance, Reactive Power Product, Availability Performance, Consumption Performance) and Trip Charge proposed?

Question 8: Do you have any comments on the remaining content of the LCIS Protocol?

Question 9: Do you have any comments on the additional clarification proposed regarding the planning permission requirement?

Question 10: Do you have any comments on the modified locational quantity criteria?

Question 11: Do you have any comments on the proposed approach for the price cap?

Question 12: Do you have any comments on the proposed imbalance prices to be used in the LCIS tender evaluation process?

Question 13: Do you have any comments on the proposed contract execution deadline and the fact that, in Ireland, grid connection offer will be processed following contract execution?

6.2. Consultation Responses

SONI and EirGrid welcome feedback on the questions posed within this paper.

Responses should be submitted through either our EirGrid or SONI consultation portals **before 9 June 2023**.

It would be helpful if answers to the questions include justification and explanation and were submitted within the questionnaire template provided with publication of this consultation. If there are pertinent issues that are not addressed in the questionnaire, these can be addressed at the end of the response.

It would be helpful if responses are not confidential. If you require your response to remain confidential, you should clearly state this on the coversheet of the response. We intend to publish all non-confidential responses.

6.3. Consultation Information Session

An information session will be held on **18 May 2023**.

The purpose of this session is to bring you through the key areas of this consultation paper and to allow time for questions and clarifications.

If you would like to attend this information session, click [here](#) to register.