Low Carbon Inertia Services Procurement (Phase 2) – Price Cap and Electricity Price

A report to EirGrid PLC

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1 Executive Summary

LCIS 2 is the second phase of procurement by the TSOs of a Low Carbon Inertia Service (LCIS). The service comprises the provision of synchronous inertia, reactive power and short circuit contribution capability.

The provision of the service by low carbon technologies is intended to facilitate a reduction in the amount of carbon-intensive conventional generation that needs to run at any given time for system stability reasons. This reduction will in turn facilitate the increased integration of renewable generation. The first LCIS tender took place in 2023.

For these tenders, the TSOs need to:

1. implement a price cap, and
2. factor into their evaluation the expected cost of each provider's energy consumption.

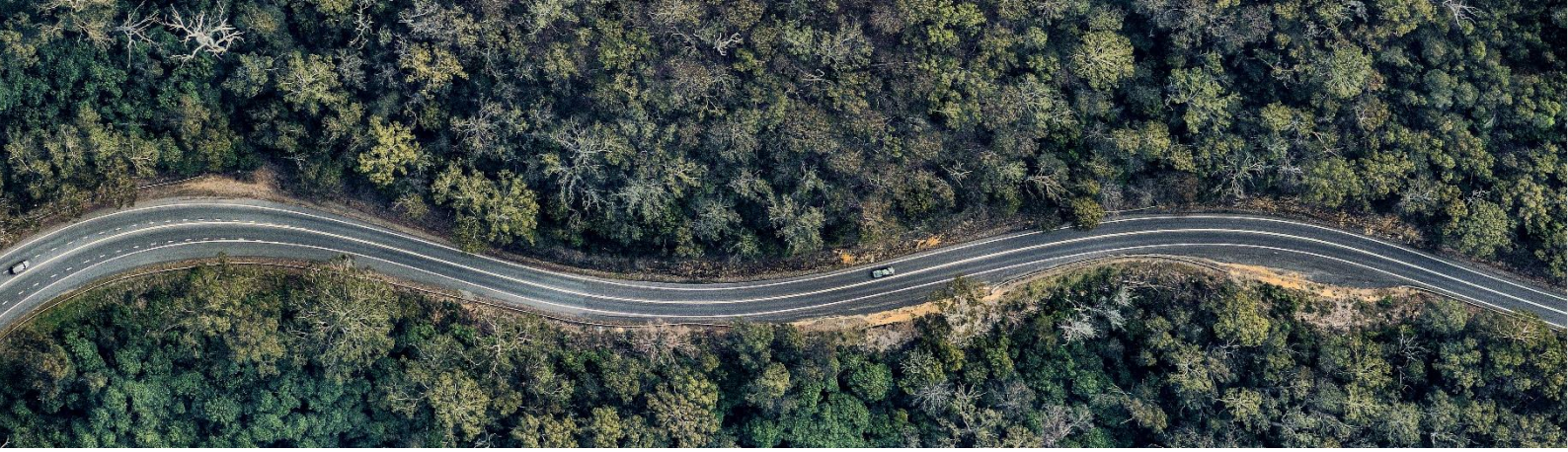
For LCIS 1, AFRY were engaged to advise on the optimal approach to setting the price cap and to determining the appropriate price to apply to the expected energy consumption. Our resulting report can be found here[1].

For LCIS 2, AFRY has updated this analysis, using the same methodology developed for phase 1.

The recommended price cap, based on a simple average of the Long Run Marginal Cost (LRMC) of the best new entrant technology and the Implied Value of the LCIS 2 procurement, is **1.81 €/MVA.s/h** or **1.54 £/MVA.s/h[2]**.

The recommended energy price, based on an average of historical imbalance settlement prices in the SEM, is **119.9 €/MWh or 101.6 £/MWh[2]**.

[1] https://consult.eirgrid.ie/en/system/files/consultation-outcomes-reports/LCIS%20AFRY%20report%20-%20Price%20Cap%20and%20Imbalance%20Price%20-%20Post%20Consultation.pdf
[2] Assuming a real GBP/EUR exchange rate of 1.18.



2 Introduction

2.1 Structure of this report

This report sets out our analysis and recommendations in relation to 2 topics – the LCIS 2 price cap and the energy price to be used to evaluate expected energy consumption costs. The report structure is as follows:

- Section 1 provides an Executive Summary of the report.
- Section 2 gives an overview of the report structure and of the background to this work.
- Section 3 summarises the context for the price cap determination, along with AFRY's analysis and recommendation.
- Section 4 provides the background to and results of the energy price analysis and presents AFRY's recommended value.
- Appendix A presents the inflation assumptions used in this work.

2.2 Background

EirGrid and SONI will launch a second phase of procurement of Low Carbon Inertia Services (LCIS 2) in 2026, awarding Fixed Term Contracts to successful tenderers, with delivery targeted for 2030. This second phase follows on from the LCIS 1 tender, which took place in 2023.

For the LCIS 1 tender, EirGrid and SONI were required to implement a price cap. They also needed to assign a cost to the expected electricity consumption of the tendered units, as the value of this consumption was factored into the tender evaluation process[3]. For LCIS 2, the TSOs are proposing in their consultation to follow the same approach.

For LCIS 1 therefore, AFRY identified and assessed available options for the approach to setting the price cap for the tender and to setting the price of electricity consumption for the purpose of the tender evaluation[1]. We then recommended a preferred approach for setting each of these 2 parameters.

For LCIS 2, we have used this same approach but have updated the analysis to reflect the latest available data. The results of this updated analysis are

[3] https://www.semcommittee.com/publications/sem-23-002-procurement-low-carbon-inertia-services-decision-paper

set out in the sections that follow, along with an explanation of the approach used.

2.3 Sources

Unless otherwise attributed the source for all tables, figures and charts is AFRY Management Consulting.

3 Price Cap

3.1 Purpose of the Price Cap

The purpose of a price cap is to protect consumers from excessive prices. It should not however interfere with the normal functioning of the tendering process.

3.2 Approach for LCIS 1

For LCIS 1, we assessed the following 3 options for setting the price cap:

1. Based on the Long Run Marginal Cost (LRMC) of the best new entrant, with some headroom;
2. Based on the TSOs' assessment of the Implied Value of the service being procured; and
3. Based on a 50:50 blend (simple average) of the LRMC and the Implied Value.

We concluded that the optimal approach was to use the 'blended value' as we deemed it to represent the best compromise between protecting consumers and rewarding providers for their contribution to system stability.

This same approach has been adopted for LCIS 2.

3.3 Long Run Marginal Cost

The general consensus remains that the best new entrant for LCIS provision is a synchronous condenser (with a flywheel). The LRMC has therefore been evaluated for this technology. This does not, however, prevent other eligible technologies capable of providing the required services from participating in the tender.

Exhibit 3.1 shows the best new entrant cost assumptions that have been used to determine the LRMC. The cost per MVA.s of a synchronous condenser is dependent on the size of the unit. The LCIS 2 tender will be open to units in the range 900-4000 MVA.s and the data in Exhibit 3.1 therefore relates to units across this size range.

Exhibit 3.1 – Cost assumptions for synchronous condensers

Cost assumptions used to estimate the LRMC of the best new entrant, for synchronous condensers from 900 to 4000 MVA.s.

Scenario	CAPEX €/kVA.s, real 2023	OPEX €/kVA.s/yr, real 2023	Cost of Capital Pre-tax, real
Low	23.7	1.7	6%
Mid	39.4	1.8	8%
High	58.8	1.9	10%

Notes: Cost data are taken from interviews with developers and reflect turnkey costs for a new-build unit.

The LRMC has been calculated based on these costs and on the following assumptions:

- the full CAPEX amount is recovered during the 8-year contract term;
- Fixed OPEX and variable operating costs arising after the 8-year contract term are assumed to be recovered by a separate market mechanism, meaning that no net cost or revenue is assumed after the contract term;
- there are no other net revenues outside the LCIS contract during the contract term; and
- there is no residual value upon contract expiry.

Exhibit 3.2 gives the resulting LRMC values for the best new entrant technology across a range of scenarios. So as to accommodate smaller units, and conscious that it is prudent to allow some headroom to account for variation between assumed and actual project costs, we have used the upper end of the range of costs in calculating the price cap.

Exhibit 3.2 – LRMC of a synchronous condenser

Estimated long run marginal costs for the best new entrant across a range of cost scenarios.

Scenario	**Estimated LRMC** €/MVA.s/h, nominal
Low	€0.73
Medium	€1.14
High	€1.69

Notes: The real 2023 cost data was inflated over the 2030-2038 period to obtain the LRMC in nominal terms.

3.4 Implied Value

EirGrid and SONI have carried out an analysis of the benefits of LCIS 2. This assessed the fuel and carbon cost savings resulting from reducing the minimum number of conventional units required to be on for the purpose of inertia provision from 5 to 2, for the study year 2028[4].

This study examined a range of fuel and carbon price scenarios. Across all scenarios, cost savings due to lower running of conventional plants were evident, as expected. These savings are treated here as a proxy for the value of LCIS 2. However, it is recognised that not all of this value can be associated directly with LCIS 2 as a broader range of capability will be required to relax the constraint on the minimum number of conventional units that must be on. For this reason, only half of the modelled cost savings have been attributed to LCIS 2.

It should also be noted that the modelled production cost savings are conservative in that:

- they do not include the avoided costs of compensation paid to redispatched renewables;
- the amount of renewable capacity on the system over the LCIS 2 contract term may be expected to increase from the study year, which would lead to more avoided redispatch than modelled;
- the target procurement volume for LCIS 2 may allow the minimum number of conventional units needed on to be reduced further than 2, depending on other factors; and
- "High Impact Low Probability" events, not captured in the modelling, may drive even higher (avoided) production costs.

Exhibit 3.3 shows the total production cost savings identified by the TSOs' study as arising from a reduction in the 'minimum units on' constraint from 5 to 2. It also shows the corresponding implied value of LCIS 2, assuming that half of these savings are a result of the LCIS provision from this procurement phase.

To prevent the price cap from being overly restrictive, we have used the highest implied value of 1.92 €/MVA.s/h in determining the blended value.

[4] The previous analysis for LCIS Phase 1 assessed the fuel and carbon cost savings from reducing the minimum number of conventional units required to be on from 8 to 5 for the year 2026.

Exhibit 3.3 – TSOs' LCIS 2 benefits analysis and implied value of moving from 5 to 2 minimum conventional units on.

TSOs' LCIS 2 benefits analysis results, and implied value, assuming half of the production cost savings are attributable to LCIS provision from this second procurement phase.

EirGrid and SONI study results			Implied value analysis	
Scenario	**Carbon prices**	**Annual total production cost savings in 2028** m€/y, nominal (2028)	**Assuming half of the savings are attributable to LCIS providers over the period** m€/y, nominal	**Implied value** €/MVA.s/h, nominal
A	Low	191	107	**0.87**
B	Medium	257	143	**1.17**
C	High	422	236	**1.92**

Source: EirGrid and SONI internal study.
Notes: To obtain the savings attributable to LCIS providers over the period in nominal money, the total nominal production cost savings in 2028 from the TSOs' study were divided by two and inflated over the 2030-2038 period.

3.5 LCIS 2 Recommended Price Cap

The recommended price cap is a 'blended value', which is a simple average of the cost of new entry of the best new entrant and the implied value of LCIS 2. This approach is a compromise, which shares the economic surplus created between producers and consumers. The resulting value of the price cap is 1.81 €/MVA.s/h, or 1.54 £/MVA.s/h, as shown in Exhibit 3.4 below.

Exhibit 3.4 – Recommended price caps for LCIS 2 procurement

Recommended price cap for LCIS 2 procurement in € and £/MVA.s per hour, using a simple average or "blend", of the cost of new entry of the best new entrant and the implied value.

Options	**Potential price caps** €/MVA.s/h, nominal	**Potential price caps** £/MVA.s/h, nominal
Best new entrant	1.69	1.35
Implied value	1.92	1.54
Blended approach	**1.81**	**1.54**

Notes: Assuming a real GBP/EUR exchange rate of 1.18.

4 Price of Electricity Consumption

4.1 Purpose of Price for Electricity Consumption

LCIS providers are not charged for the energy they consume in providing the service. This cost is borne by the TSOs. However, tenderers must state their expected energy consumption at tender stage and the providers are then incentivised to meet this expected level via the energy performance scalar applied to their payments.

The expected energy consumption is also factored into the tender evaluation process so as to ensure the associated cost to the TSOs is reflected in the evaluation. This requires a price to be assigned to the energy expected to be consumed.

4.2 Approach for LCIS 1

For LCIS 1, we examined a number of potential approaches to setting the benchmark price that could be used to calculate energy consumption costs. These were based on:

1. Historical average imbalance prices;
2. Wholesale electricity price projections from a 'reputable consultant' or other third party; and
3. A calculated price derived from forward commodity prices and marginality assumptions.

Taking into account the relatively low materiality of the choice of benchmark price, we concluded that using historical average imbalance prices was the optimal approach for reasons of practicality, transparency, and simplicity.

4.3 Historical Average Imbalance Prices

For LCIS 2 we have examined historical imbalance prices since I-SEM go-live. The average imbalance price by year, adjusted for the expected inflation over the LCIS 2 contract period, is shown in Exhibit 4.1 for each full year since Oct 2018. The value for 2022 is considered an outlier as prices were exceptionally elevated in that year due to the invasion of Ukraine.

In addition, there is an evident step change from 2020 to 2021. For LCIS 1, the benchmark price was set using the last 3 years' worth of data available at that time, excluding 2022 i.e. data for 2019-2021. For LCIS 2, we recommend an approach consistent with this, whereby the last 3 years'

worth of imbalance settlement price data is used to set the benchmark price, excluding the 2022 year i.e. 2021, 2023 and 2024.

The benefit of this approach, aside from consistency with that taken in LCIS 1, is that it strikes a balance between using a time period that is long enough, but also recent enough, to be representative of likely future prices.

Exhibit 4.1 – Historical average imbalance prices by year

Average imbalance prices for each full year since I-SEM go-live in Oct 2018. Exceptionally high prices are evident in 2022 due to the energy price crisis.

Year	Average Imbalance Price €/MWh, nominal
2019	48.3
2020	39.6
2021	**135.2**
2022	219.1
2023	**119.6**
2024	**110.2**

Notes: The average prices have been adjusted to reflect expected inflation over the LCIS 2 contract term. Data for the years 2021, 2023 and 2024 were used to set the recommended benchmark price.

4.4 LCIS 2 Recommended Benchmark Price

The average imbalance price over the 2021-2024 period, excluding data for the year 2022 and adjusted for inflation over the contract term, is 119.9 €/MWh or 101.6 £/MWh[2].

As a sense check, we have compared this to AFRY's latest wholesale electricity price projections[5] averaged over the years 2030 to 2037 (i.e. the contract term). These are in the range 76.1 to 126.4 €/MWh in nominal terms and therefore encompass the value calculated based on historical average imbalance prices.

[5] Based on AFRY High and Low Q1 2025 projections.

Annex A Inflation assumptions

All prices and cost data presented in this report are in nominal money terms, unless indicated otherwise. Exhibit A.1 presents the inflation assumptions used in this report. These are derived from a Bloomberg poll of financial institutions' inflation forecasts and trended towards our long-term inflation rate of 2%.

Exhibit A.1 – Annual euro-zone inflation rate assumptions

	2023	2024	2025	2026-2037
Euro-zone inflation rate	5.5%	2.4%	2.1%	2%

Source: Bloomberg, AFRY.

Quality control

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AFRY Management Consulting Limited
King Charles House
Park End Street
OX1 1JD
Oxford
United Kingdom

Tel: +44 1865 722 660
afry.com
E-mail: consulting.energy.uk@afry.com