Annex 1 - LirIC response to Initial Project Assessment of the Third Cap and Floor Window for Electricity Interconnectors

Contents

1. Ofgem relies on a Socio-Economic Welfare modelling output which is flawed

We contend that the Socio-Economic Welfare ("SEW") modelling used by Ofgem, and undertaken by ARUP, appears to be an outlier in its assumptions, its methodology, contains unexplainable errors and the outputs in the consultation are flawed.

In an effort to gain a clear understanding of the modelling which underpins the minded-to position by Ofgem, we have been working with LCP Delta ("LCP") to replicate the ARUP Market Modelling results (Annex 2) – utilising the same scenario assumptions and the methodology, as far as it is adequately described, in the ARUP report. It has proven challenging to understand why it has not been possible to replicate the results. In the sections below, and in Annex 2, we present our understanding of the significant difference in results between ARUP and LCP. We highlight the basic errors made in interconnector welfare allocations that have a material impact on the outputs, flawed assumptions, and concerns with the modelling approach. This is based on the information provided in the consultation, and further engagement with Ofgem and ARUP over the consultation period where clarificatory questions were sent, noting that responses have in many cases neither clarified nor answered our concerns.

LCP has a wealth of modelling experience with respect to power market modelling, revenue forecasting, energy economics and finance, supporting clients in understanding complex market dynamics to inform policy and/or investment decisions. They utilise the EnVision modelling framework, established in 2012 and has been developed in-house over the past decade specifically for the GB and Irish markets. LCP has been relied upon by DESNZ (BEIS), Ofgem and National Grid to support GB policy analysis for over a decade[1]. LCP undertook the modelling submitted as part of LirIC's application to the Window 3 process.

LCP sought to replicate ARUP's First Additional (FA) case. The FA case was chosen over the Marginal Additional (MA) to remove any differences or complexity associated with modelling the impact of the other Window 3 applicant projects. Even so, as set out here, and in Annex 2, significant disparity between the respective sets of results persists. We understand that Ofgem primarily have made use of the MA case for decision making. However, contrary to Ofgem's assertion in the consultation document (paragraph 3.39[2]), the FA case now seems more reflective of the expected future landscape for interconnection given Ofgem's minded-to position is to reject six out of the seven projects.

LCP's outputs replicating the ARUP analysis using the Consumer Transformation (CT) scenario (as the central scenario), shows the addition of LirIC has a positive benefit across GB and SEM combined, with positive total SEW benefits being realised in GB of over £1 billion, and a net positive position for the UK overall (see Figure 1 below).

[1] Policy Impact Analysis Consultancy | LCP Delta

[2] *"We have chosen to follow this approach because we consider that the MA approach depicts a more probable view of the world than the FA approach."*

Socio-economic Welfare Results for GB and I-SEM excluding constraints, £(real, 2022)m, NPV 2027-53

SEW impact of LirIC (NPV £m)	GB	NI	ROI	TOTAL
Consumer welfare	-1,219	564	2,468	1,813
Producer welfare	1,527	-1,384	-2,360	-2,217
Interconnector welfare	1,169	1,420	-473	2,117
LirIC Costs	-424	-424	0	-849
TOTAL (excl LirIC costs)	1,477	601	-365	1,713
TOTAL (incl LirIC costs)	1,052	176	-365	864

Figure 1 - LCP's replication of ARUP's modelling showing positive SEW results for GB and I-SEM (excluding constraints), £ (real, 2022) m, NPV 2027-53

The LCP outputs showed substantial differences in welfare (see Figure 2), when compared to those presented by ARUP despite seeking to replicate the ARUP model and scenario assumptions.

Socio-economic Welfare Results Comparison for GB (excluding constraints - £(real, 2022)bn, NPV 2027-53

Scenario	Consumer	Producer	Interconnector*	Total
Arup (CT FA Scenario)	-2,516	2,546	-475	-446
LCP Delta (CT Scenario)	-1,219	1,527	745	1052
Difference	-1,297	1,019	1,220	1,498

*Includes LirIC costs

Figure 2 - Comparison of ARUP's GB SEW results (CT FA) with LCP's replication (excluding constraints), £ (real, 2022) bn, NPV 2027-53

While producer and consumer welfare were directionally aligned and proportionately similar, the interconnector welfare outputs were notably different (amounting to c. 85% of the difference). ARUP outputs showed over a £1.4billion lower SEW in comparison to the LCP model outputs.

Through question and answers interaction between LirIC and Ofgem, LCP carried out a deep dive into the data provided by Ofgem. The source of that difference appeared to be related to i) the incorrect calculation of interconnector welfare; and ii) the sensitivity of the SEM wholesale price and counter-intuitive impacts when LirIC is added in the ARUP model.

The conclusions of the analysis around i) and ii) above are discussed in the following two chapters, followed by more general concerns and open questions regarding the ARUP modelling approach and its outputs.

1.1 Incorrect calculation of interconnector welfare allocations

The data which has been shared with Window 3 applicants indicates that a 50:50 allocation of interconnector welfare has been applied on all borders in the ARUP modelling, including on the GB-SEM border. **This is a basic misunderstanding of the arrangements on the border and a material error**.

It is well-known that the arrangements on this border vary, with EWIC and Moyle having 100% allocation of interconnector welfare to SEM due to their bespoke regulatory arrangements in the SEM, and only Greenlink operating on a 50:50 split as it has been granted a Cap and Floor regime on both ends.

LCP utilised the ARUP data to estimate the materiality of the impact this would have, as shared with Ofgem, as per Figure 3 below (and on slide 21 of Annex 2), which shows the difference between LCP's replication of ARUP's CT (FA) case; alongside LCP's analysis of the data to estimate the impacts for the ARUP CT (FA) and the ARUP CT (MA) case.

GB Socio-Economic Welfare impact of LirIC (NPV £m)	LCP FA	Arup FA*	Arup MA*
50:50 split on all ICs	1	-0.4	-0.6
Moyle and EWIC all I-SEM	1.3	0.3	-0.1
Change	0.3	0.7	0.4

*As provided by Arup in updated figures

Figure 3 - LCP's estimate, using ARUP data, of the impact correctly allocating interconnector welfare on the GB-SEM border would have on ARUP's CT (FA) and CT (MA) case, NPV £m

Following this, ARUP provided updated figures correcting this significant error and misallocation of welfare (see Table 1 below). With the correct allocation of interconnector welfare for interconnectors on the GB-SEM border, has LirIC having a positive overall GB SEW for all scenarios in the FA case. This is more representative of the future based on Ofgem's minded-to position, which rejects the majority of projects. In the Marginal Additional case there is a marginal -£0.1bn SEW deficit in the central CT scenario.

Table 1 - ARUP's figures corrected for misallocation of interconnector welfare on the GB-SEM border for all cases and scenarios, £bn

Total GB SEW (ARUP analysis, corrected for error in interconnector welfare allocation) (£Billion)	LW	CT	FS
First Additional	0.4	0.3	0.1
Marginal Additional	-0.5	-0.1	-0.6

Table 2 - LCP's replication of ARUP's modelling approach corrected for the misallocation of interconnector welfare on the GB-SEM border for the CT (FA) case, £bn

Total GB SEW (LCP analysis) (£Billion)	LW	CT	FS
First Additional		1.4	
Marginal Additional			

We note that despite engagement during the consultation period, we have yet to understand why the initial 50:50 allocation was utilised when it is not an accurate reflection of the reality on that border. We seek to understand further from Ofgem and ARUP the rationale for this assumption being utilised in the modelling in the first place, as well as requesting it is amended.

Ofgem must, amongst other things, amend this material error in the interconnector SEW allocation before proceeding to its decision.

It is notable that the LCP outputs show a considerable higher SEW for LirIC in its CT FA case outputs (seeking to replicate the ARUP modelling), and given the basic errors made in the ARUP analysis, would suggest that **Ofgem must now give weight to LCP replication outputs and the LCPs 2022 study for LirIC**, rather than ignoring the evidence provided by developers (as stated in paragraph 3.12 of the consultation document).

Incorrect connection date means Floor payments are incorrectly applied

ARUP's modelling suggests LirIC may require very limited floor payments in the early years of operation under the Leading the Way (LW) and Consumer Transformation (CT) scenarios in the MA case. ARUP's modelling has lower price spread between GB and SEM than the modelling undertaken by LCP, therefore although the interconnector flows are similar, ARUP's modelling outputs lower congestion revenue for LirIC.

Whilst we have concerns that the ARUP modelling is flawed, we would note that the limited floor payments (presented in ARUP's modelling) are expected in the years 2030 and 2031. LirIC has a connection date of 2032 in GB, meaning operation ahead of then is not possible. Therefore, given the connection date for LirIC is 2032, it would be reasonable to re-run the model excluding the years 2030 and 2031 to obtain more accurate results, noting that this will increase the GB consumer welfare benefit.

Incorrect allocation of welfare benefits to Northern Ireland

We contend that Ofgem's specific duties related to cooperation and coordination with the NI Authority and therefore means LirIC stands apart from all the other projects (See Chapter 3). Those duties should have been specifically recognised in the way in which the minded-to position was reached.

It is relevant for Ofgem to consider how any decision may impact on enabling adequate interconnection between GB and Northern Ireland. LCP's analysis for LirIC (submitted in the Window 3 application and included in our response as Annex 5) as well as LCP's replication of ARUP's modelling (Annex 2) split the SEW results into GB, NI and Republic of Ireland ("RoI"). The modelling by ARUP, for Ofgem, did not account for a split in SEM welfare results between NI and RoI.

On request, Ofgem provided a "rough" calculation of the split of SEM benefits between NI and RoI to enable an overall view of the benefit of LirIC to the UK. This calculation breaks down consumer welfare based on demand split between NI and RoI, and producer welfare based on the generation capacity split between NI and RoI – these are both a reasonable proxy for consumer and producer welfare respectively.

The interconnector welfare has been split on an arbitrary 50:50 basis between NI and ROI, which is incorrect and is a basic misunderstanding of how the benefits should be correctly allocated.

Interconnector welfare is made of up multiple components, including impacts of LirIC (revenues and cost) and impacts from LirIC on other interconnectors. These two parts should be allocated separately. All of the direct LirIC impacts being attributed to NI as the connecting country (as per Moyle where consumers in NI bear all the costs of the interconnector) and then then impact on other interconnectors split based on the relevant allocation (Moyle to NI, EWIC to ROI and Greenlink 50:50 GB:RoI).

Therefore, based on the data provided by ARUP, LCP has sought to correctly allocate the interconnector welfare in ARUP's results in the correct way to understand the impact on UK results. This impact is estimated by LCP and outlined in Figure 4 below, demonstrating that LirIC would bring a net benefit to the UK of £0.4bn in ARUP's modelling.

GB Socio economic Welfare impact of LirIC NPV (£m)	Arup FA scenario: Ofgem NI/ROI split	Arup FA scenario: corrected IC welfare NI/ROI split
GB welfare	-446	-446
NI welfare	291	907
UK welfare	**-155**	**461**
ROI welfare	2,305	1,689
Total welfare	**2,150**	**2,150**

Figure 4 - Estimated impact of correct IC welfare split between NI and RoI using ARUP's modelling results, NPV (£m)

As discussed earlier, this is higher again in LCP's replication of the ARUP modelling, with the UK benefit totalling £1.2bn (Figure 1).

Ofgem must, where this incorrect information has been communicated to third parties, immediately correct this error to avoid confusion with stakeholders and avoid further damage to the LirIC project[3].

1.2 Wholesale price sensitivity and counter-intuitive impacts

Adding LirIC results in some unusual and unexplained outputs in the ARUP modelling. These are expanded on further in this chapter, supported by the LCP analysis in Annex 2.

Investigation of unusual interconnector welfare impacts

ARUP's modelling shows an extreme impact on other interconnectors between GB and SEM when LirIC is added, with their congestion revenues falling by more than the additional revenues of LirIC. As a result, the ARUP modelling has overall negative interconnector welfare, not seen in LCP's modelling outputs. This is an unusual result.

Whilst it would be expected that the addition of an interconnector would reduce the SEM price under the scenarios assumed (LCP's modelling also suggests this) the extent and severity of the drop is unusual and unexplained from the data provided. At present not enough detail has been provided to justify and explain the impact LirIC appears to have on the SEM price in ARUP's modelling.

Investigation into the difference in congestion revenues when LirIC was added looked at flows and prices. While the difference on flows between the LCP and ARUP modelling are relatively small (slide 13, Annex 2), the difference in SEM wholesale prices was significant, with ARUPs model showing LirIC led to a sharp reduction in SEM wholesale prices, particularly into the future.

It is this price reduction that drives the lower congestion revenues in the ARUP modelling. In comparison by 2050 in ARUP's modelling SEM prices are £16/MWh lower when LirIC is added than in LCP's model (Figure 5).

[3] Ofgem Letter to MP, 9 May 2024 incorrectly reported the net negative impact for UK and Northern Ireland

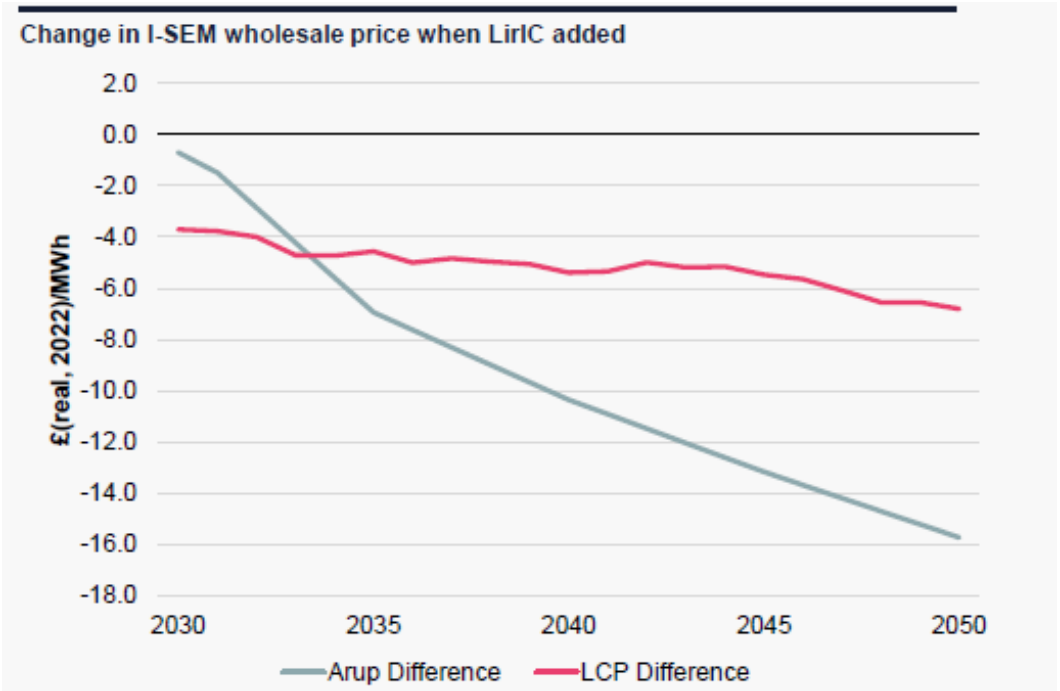

Figure 5 - Change in wholesale price with LirIC added, ARUP modelling and LCP replica of ARUP modelling

The sections below describe the further investigation of the potential drivers of this significant price difference, to seek to understand why the SEM wholesale price appears unrealistically fragile and produces some unexpected results.

We made requests for data to understand this issue further, key data was not able to be provided, specifically a price-duration curve, which would provide explanatory information regarding the impact on wholesale price over the modelled period. It is unclear why this routine output was not made available, as it is simple to produce from the modelling outputs.

Therefore, the analysis that LirIC and LCP have been able to complete is limited, based on the data provided and the responses by Ofgem and ARUP to questions (where they provided a relevant answer).

In summary, despite detailed investigation by LCP and engagement via Ofgem, ARUP have not been able to provide the relevant data or a written explanation for the cause of the significant drop in SEM wholesale price.

Unexplained changes in SEM Generation

In ARUP's modelling, the addition of LirIC results in some unusual and unexplained changes in generation in SEM (slide 15, 16 & 17, Annex 2).

The change in wholesale price is related to the generation that is displaced by the energy carried over the interconnector. The change in average wholesale price, following the addition of the interconnector is directly related to the sources of energy displaced, typically expensive and high carbon-emitting peaking plant.

These are not able to be fully explained from the data provided by ARUP, or through examination of publicly available data used for the modelling (such as the FES 2022 databook).

Analysis of the changes in generation showed a mismatch of energy, where imports from the interconnector were not offset by reductions in production in SEM. This 0.9TWh of the generation decreases as a result of LirIC net imports were "unexplained". Subsequent engagement with Ofgem and ARUP have failed to provide clear answers to fully explain this. ARUP produced information that suggested that LirIC displaced a significant volume of Demand Side Response, however this appears an unusual outcome as DSR typically is a shift of demand from one time period to another rather than a demand reduction. ARUP provided a single line answer that "DSR is set up as a peaker on the supply side". It is impossible from this to validate this or to understand how this has been priced in the ARUP modelling. The definition of DSR and related assumptions have not been shared with respect to GB or connected countries. Overall, DSR and wind are the largest sources of offset in SEM in ARUP's modelling in response to energy importing from GB through LirIC. Therefore, it remains another unexplained and unusual outcome of ARUP's model.

Other counter-intuitive changes

When LirIC is added to the system, the ARUP model output shows substantial decreases in wind production in SEM (CT FA). This means that in ARUP's modelling, it is preferable to import energy from GB (including incurring the cost of losses over the interconnector) than to generate from wind in SEM.

When LirIC is added to the system, the ARUP model records an increase in unserved energy, (CT FA). This is counter-intuitive as it implies that the system is less secure following the addition of firm capacity. This issue needs to be fully investigated and addressed to understand the issue, rather than ARUP seeking to dismiss this as an "outlier".

These are unexpected and unexplained results, which call further into question the credibility of the ARUP modelling and the capability to adequately explain the workings of the model.

Potential impact on wholesale prices to methodological choice of allowing Unserved Energy

From our further investigation of the ARUP modelling approach and results, we have identified that ARUP's modelling includes unserved energy in some scenarios (slide 22, Annex 2). It is unusual to adopt a modelling methodology allowing unserved energy, rather than ensuring the system meets the reliability standard for each region.

In the FA case, both LW and CT has unserved energy in GB in some years. In LCP's view this is an unrealistic result, especially given that GB has a capacity market which should ensure that there is little to no unserved energy.

The concern with this approach is that it may have an impact on wholesale prices, causing unrealistically high prices in some periods impacting modelling results. To avoid periods of unserved energy and the extremely high prices this may cause, LCP's modelling approach ensures that additional peaking capacity is added to meet the security of supply standard in all years.

In summary, we have highlighted a number of unexpected and unusual model outputs which remain unexplained and raise questions as to the robustness of the model framework configuration.

1.3 Wider concerns with the Socio-Economic Welfare modelling

Unrealistic SEM assumptions

The SEM assumptions from FES 2022 show significantly lower levels of decarbonisation of the Irish power sector in comparison to the respective government plans in SEM, as well as publicly available data such as Tomorrow's Energy Scenarios ("TES") developed by EirGrid and SONI. For example, FES 2022 only includes 5GW capacity for offshore wind by 2050 compared to ROI government plans to have 5GW by 2030 and 'at least 35GW' of offshore wind by 2050. Renewables capacity is also significantly lower for offshore wind, onshore wind and solar in the FES compared to the TES Self-Sustaining scenario (which represents a realistic path to net zero for SEM). Despite this low decarbonisation trajectory, the ARUP assumptions include additional interconnection capacity between SEM and France, despite no projects being proposed. ARUP appear to have changed their approach from a realistic approach described at the initial Workshops, of recognising EU interconnectors that were operational, under construction or on the PCI/PMI list, to now including speculative, undefined interconnector projects.

Therefore, in our view the assumptions used for SEM in the ARUP modelling framework are out of date, unrealistic and are not reflective of current policy. More information can be found on slide 25 of Annex 2.

Approach to modelling Security of Supply

We also have concerns with respect to the modelling approach taken by ARUP with respect to how the addition of a new interconnector impacts security of supply (slide 23, Annex 2). The addition of a new interconnector improves security of supply as it can provide firm capacity during a stress event. The addition of an interconnector, such as LirIC, to the system should therefor mean that other capacity in the Capacity Market (like peaking gas plant) would no longer need to be built as LirIC contributes to the overall derated capacity requirement. This should be accounted for in the socio-economic welfare modelling, to ensure that the overall level of firm capacity (and therefore the reliability standard) is consistent in counterfactual and factual. It is not included in the ARUP methodology at present.

In LCP's modelling it is assumed that LirIC would have 38% derating factor in capacity market auctions. This equates to 266MW of firm capacity on the system. This would mean, for example, that 280MW of OCGT capacity (at 95% derating) would no longer need to be built when LirIC is added to the system, which would provide a system cost saving from the reduced capital and operating costs associated with this capacity. Based on the capex in DESNZ generation costs report, this would result in a total additional saving in NPV terms of £135m.

Capacity Market revenue modelling

The assumed basis for ARUP calculating the capacity revenues is to assume that capacity included in the scenarios for GB and connected counties are secure (page 48 of the Market Modelling report). This is clearly not a robust assumption as for example, in the Leading the Way scenario, unserved energy is observed. This may therefore be understating the Capacity Market price and therefore the revenues due to the interconnector (assuming they are a price-taker).

In summary, Ofgem has not been able to provide us with the requested supplemental data or an adequate explanation or reasons for the unusual modelling approaches, or the counter-intuitive results in the SEM region when LirIC capacity is added. Answers received to-date do not adequately explain, for example, when LirIC is added: the unexpectedly large reduction in wholesale prices; the reduction in SEM renewable production; or the increase in SEM unserved energy.

We would encourage Ofgem again to review its modelling in light of the above legitimate and material concerns and give proper weight to and assessment of other reference points in its decision-making framework (rather than dismissing the evidence without consideration of the outputs, as stated paragraph 3.12 of the consultation), including the 2022 SEW study provided by LirIC, and have regard to the replication outputs that both show positive GB SEW outcomes[4]. That study is based on a mature, robust, well understood modelling framework (developed by LCP and regularly used by Government), which fully models both SEM and GB at a level of granularity and accuracy that is not afforded to the technology-level and unusual modelling framework adopted by ARUP.

Ofgem appear to have given undue weight to the analysis carried out by ARUP, when read in the context of other SEW studies that provide counter views on the benefit to GB, and therefore have failed to recognise that its consultant's analysis is an outlier.

Ofgem there must, amongst other things, before proceeding to its decision:

1. amend the material error in the interconnector SEW allocation
2. give weight to LCP replication outputs and the LCPs 2022 study for LirIC
3. reassess the Marginal Additional basis of its decision (if it continues to reject the majority of projects)

2. Ofgem's assessment methodology is contrary to policy, expectations and disregards relevant evidence

We contend Ofgem's chosen approach is not in accordance with its ICPR decision published on 13 December 2021.

It places undue weight on a single quantitative SEW study by ARUP (noting our concerns above as to its robustness) and does not fully recognise the long-term strategic benefits and the resulting legitimate expectations of developers from the array of published Ofgem/Government policy documents, including:

The December 2020 Energy White Paper

In December 2020 the Government published the Energy White Paper which committed to *"…realise at least 18GW of interconnector capacity by 2030. This represents a three-fold increase from current levels and will position us as a potential net exporter of excess green energy…"*.

The Government's commitment clearly recognises and supports the transition of GB from being a net importer to net exporter and the benefits of that.

[4] The basis of the 2022 submitted study is similarly FES (2021), however, utilising more appropriate demand and supply capacity assumptions for SEM

The Smart Systems and Flexibility Plan, July 2021

The SSFP[5], a joint publication by Ofgem and DESNZ[6], is supported by Electricity System Flexibility Modelling[7], including assessment of the impact different levels of interconnection capacity has on system cost and emissions intensity (Figure 6). Three levels of interconnection were tested, 9.8GW, 17.9GW and 27GW. The modelling clearly demonstrates that a greater capacity of interconnection reduces system cost and emissions intensity by reducing the need for peaking generation and lowering renewable curtailment. Importantly, the analysis did not identify a "tipping point" beyond which additional interconnection capacity provided no system value.

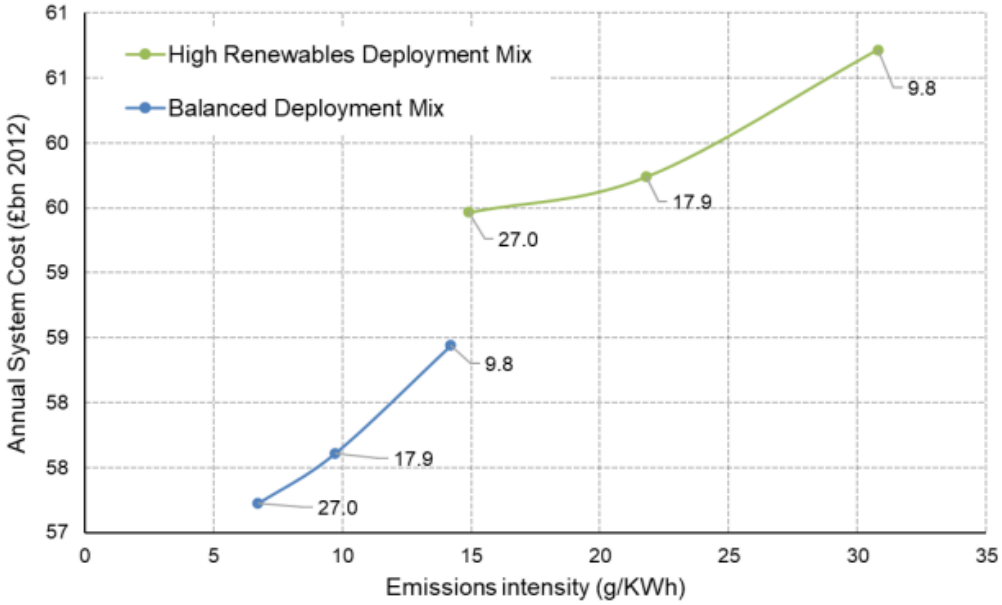

Figure 3 shows the system cost and emission intensity of systems with different deployments of interconnection capacity. Each dot represents a different model run, the amount of interconnection in each deployment mix is shown in the data labels (9.8GW, 17.9GW, 27GW). Results are shown for two illustrative deployment mixes: balanced and high renewables.

Figure 6 – Smart Systems and Flexibility Plan 2021, Impact of interconnection capacity on system cost and emissions in 2050

The Smart Systems and Flexibility plan ("SSFP") recognised the value of flexibility, and the role interconnectors play providing that, compared to other technologies.

The analysis completed as part of the SSFP tested concluded that interconnection plays a different role in the system to DSR and storage (those two technologies being substitutable). "*Higher levels of storage and DSR flatten the demand profile and maximise the utilisation of renewables within a day. Their main benefit to the system is on days where there are both periods of surplus and deficit renewables generation, for example storing a surplus in overnight periods for use in the evening peak… interconnection can provide system benefits where there is either surplus or deficit renewable generation across the entire day*".

[5] Transitioning to a net zero energy system: Smart Systems and Flexibility Plan 2021 (publishing.service.gov.uk)
[6] Department for Business Energy and Industrial Strategy at the time.
[7] Smart systems and flexibility plan 2021: Appendix I - Electricity system flexibility modelling (publishing.service.gov.uk)

It showed a higher flexibility system brings significant benefits, ranging from £29 billion to £64 billion for cases with 17.8GW of interconnection[8].

The SSFP also acknowledged that in the future, the opportunity for GB was as an exporter of power.

Net Zero Strategy

In October 2021, the UK Government published its Net Zero Strategy which sets out how the UK will meet its legislated goal of net zero emissions by 2050, including the delivery of a decarbonised power system by 2035[9]. The commitments set out in the strategy provide further context as to why it is important to understand the full and wide range of impacts of interconnection. This includes further reiterating the importance of flexible technologies, such as interconnection, in supporting the integration of renewables whilst ensuring the energy system is reliable.

Strategy and Policy Statement

DESNZ published the Strategy and Policy Statement[10] ("SPS"), which entered into force on 1 May 2024. The SPS complements the publications above, providing guidance to the energy sector on the actions and decisions that are needed to deliver the UK Government's policy goals and places emphasis on where government expects a shift in the energy industry's strategic direction. Ofgem is required to have regard to the strategic policies in the SPS whilst carrying out their regulatory functions, as set out in Section 132 of the Energy Act 2023.

Within the SPS, one of the UK Government's strategic priorities includes ensuring that *"A strategic, whole system approach to plan and build reliable, resilient, sustainable network infrastructure* ***which is appropriately connected to wider markets****"* (our emphasis added).

Ofgem Interconnector Policy Review

In the ICPR decision, Ofgem decided (amongst other things) to "*ensure that the wider impacts of interconnection are assessed within our decision-making framework*". Moreover, the ICPR Decision expressly acknowledges that "*the effect of net zero energy policy will be to lower those structural price differentials over the next decade, and in some instances reverse them longer term. These two factors mean that we can no longer automatically assume a direct correlation between price signals and consumer welfare. Instead, the role that interconnectors play in the energy system is changing and our decision-making needs to reflect this*". (Paragraph 2.14, ICPR Decision).

Ofgem also recognised at paragraph 3.10 of the ICPR Decision that the needs case assessment framework "*used in the past*" to determine whether applicant projects are in consumers' interests "*did not fully capture the wider impacts, both costs and benefits, of interconnectors*". Ofgem decided to revisit the needs case assessment framework to be used in the future cap and floor regime (i.e. including Window Three) "*to ensure*

[8] SSFP, Appendix 1: Electricity System Flexibility Modelling (Table 4)
[9] HM Government, Net Zero Strategy: Build Back Greener (October 2021)
[10] DESNZ, Strategy and policy statement for energy policy in Great Britain (May 2024)

that any future assessments take into full consideration a range of factors, including wider impacts, that could contribute to consumers' interests". (Paragraph 3.30, ICPR Decision).

Whilst Ofgem decided in the ICPR Decision that "*socio-economic electricity market modelling remains a valuable tool for assessing the needs case for future interconnectors*", it was also expressly acknowledged that "*any modelling exercise has limitations and necessarily makes simplifications, that should be taken into full consideration when making regulatory decisions*". It was also decided by Ofgem that the "*the wider impacts of interconnectors should be better assessed and integrated within our future needs case assessment framework. We consider that the role that interconnectors play in the energy system is changing and that wider impacts are likely to make up a proportionally larger part of the total impact of future projects. We will need to ensure that our needs case framework appropriately captures the full range of impacts. Specifically, we think that a future assessment framework should consider, alongside socio-economic modelling, the impact of interconnectors on system operability, decarbonisation, flexibility, and security of supply*." (Paragraph 3.34, ICPR Decision).

In addition, in the ICPR decision, Ofgem stated *"Following our review, in the near-term we plan to open a targeted cap and floor application window in mid-2022 to allow projects to come forward. This is in line with the Government ambition to deliver at least 18GW of interconnection capacity by 2030 as set out in the December 2020 Energy White Paper. "*

In summary, the policy framework (set out above) set a legitimate expectation for greater interconnection and that future assessments would take a wider strategic view of the benefits to consumers of interconnection, particularly in relation to security of supply and flexibility.

2.1 Consistency is needed with the Interconnector Policy Review Decision

In Ofgem's minded-to position, they state that the reasons they are not inclined to offer a cap and floor regime to LirIC are *"based upon the negative total welfare impact on GB of the project. In the market modelling, LirIC has a negative total welfare impact on GB in both the first additional and marginal additional cases. Wider benefits that were assessed in the modelling, such as the project's positive decarbonisation and security of supply impacts, are modest by comparison, and do not justify approving the project, in light of the project's negative welfare impact."*

However, Ofgem's ICPR set out how decisions would take a wider view of the benefits to consumers of interconnection, particularly in relation to security of supply, flexibility and system operability. The wider strategic benefits of further interconnection were repeated in Chapter 2 of the minded-to position, including acknowledgement of GB becoming a net exporter, and interconnector's role in providing flexibility to a decarbonised GB system, *"GB's renewables rollout means that under most future scenarios we anticipate that our electricity wholesale price will likely move from being one of the highest to one of the lowest in Europe. This means that it is expected that interconnectors will serve a different purpose, as a way of providing flexibility to our renewables-dominated energy system"* (paragraph 2.1). However, there is no further evidence of these wider benefits, or quantification of benefits considered as part of Ofgem's assessment.

A failure by Ofgem to make a decision in accordance with the parameters of the ICPR decision not only results in material detriment to projects such as LirIC, but undermines investment certainty in Ofgem policies, making the decision irrational in the context of the stated aim to increase interconnection.

In the following chapters we further examine how these have been assessed in practice by Ofgem for Window 3 and then discuss the degree to which the minded-to position appears to have regard to Government policy.

2.2 NGESO modelling of system operability benefits is welcome, but fails to give weight to wider benefits

In this chapter, we highlight the analysis undertaken by NGESO which suggests LirIC would have an overall positive impact on the GB system, offsetting the marginal SEW disbenefit (when ARUP analysis is corrected for the error in the interconnector welfare allocation). We also highlight currently unquantified and strategic benefits which would have weight in an assessment aligned to the ICPR decision.

The combined constraint cost savings, Frequency Response, Reactive Power and System Restoration savings and the (unquantified) benefits from avoided RES curtailment modelled by NGESO shows the addition of LirIC would be positive for the GB system and deliver savings for consumers.

Window 3 Assessment, reduced constraint and system operability costs

It was noted in NGESO's Annual Report of Balancing Costs (published May 2024) that thermal constraints are the most significant component of balancing costs, contributing to 40% in 2023/24, and they expect to increase in future years as the network becomes more congested. They also explicitly note that increased wind generation is expecting to drive up balancing costs, *"particularly in the regions north of the B6 boundary"*[11]. It is also worth noting that the analysis has been conducted based only on the reinforcements currently planned. It is a known and understood fact that network constraints as a result of lack of investment in transmission infrastructure is an existing challenge[12].

The addition of LirIC is shown to reduce the most well-known and understood transmission constraints in the GB network – that on a windy day all the generation located in Scotland demand cannot be transport south into England where it is needed.

NGESO's analysis shows that the addition of LirIC net positive effect on the network, with savings on the B6, B7 and B9 boundaries (although it increases constraints across the more northern B4 boundary). It helps to reduce the curtailment of renewables in Scotland, exporting to Northern Ireland when there is an excess on the system, reducing the flows on key thermal constraints on the network. A known challenge which NGESO is predicting to continue to get worse.

LirIC decreases the present value of constraint cost in the FA case for CT, and the MA case for LW and CT. For the CT scenario, in the FA case this is valued at £55million[13] (Present Value, 25-year, real 2022), and increases to be £230million[14] (Present Value, 25-year, real 2022) in the MA case. In addition, LirIC also leads to a

[11] NGESO Balancing Costs: Annual Report and Future Projections (May 2024)
[12] Lack of ambition and attention risks making electricity grids the weak link in clean energy transitions - News - IEA
[13] Figure 73 of NGESO's Window 3 modelling report
[14] Figure 74 of NGESO's Window 3 modelling report

£23million saving in constraint costs in the LW scenario for the MA case. In addition, LirIC is expected to consistently provide system operation benefits of around £120million in all scenarios.

We note that the impact of LirIC is considerably more favourable than other projects which are all rated as either "amber" or "red" in ARUP's Multi-Criteria Assessment as they are not expected to deliver constraint cost savings.

In summary, when the ARUP study is corrected for the error in interconnector welfare allocations and this is combined with the NGESO quantified benefits, LirIC shows an overall positive result for the central Consumer Transformation (MA) scenario, before consideration of wider strategic benefits (see Table 3 below).

While LirIC remains negative, when using on ARUP's SEW analysis for the other scenarios, we would highlight again the clear concerns regarding the robustness of the analysis. The basic and material errors discovered so far reduce the confidence when also considering the potential unexplained issues noted above. We would suggest Ofgem gives weight to the LCP replication study outputs (CT (FA) scenario, showing a ~£1billion higher Total GB SEW compared to the ARUP model, see Annex 2, slide 6), consider the potential read-across and how that may impact on the other scenarios and the previous LCP 2022 study provided as part of the LirIC application.

Table 3 - LirIC quantified benefits total, combining ARUP analysis (corrected for error in interconnector welfare allocation), NGESO constraint savings, and NGESO system cost savings

Benefits (£Billion)	LW (MA)	CT (MA)	FS (MA)
Total GB SEW (ARUP analysis, corrected for error in interconnector welfare allocation)	-0.5	-0.1	-0.6
NGESO constraint saving	**+0.01**	**+0.23**	**-0.3**
NGESO system cost savings	**+0.14**	**+0.13**	**+0.14**
Quantified Benefits total	-0.35	**+0.26**	-0.76

Ofgem must also consider, in alignment to its ICPR decision to give weight to the LirIC project's specific wider benefits described below.

2.3 Strategic and wider benefits that should be given weight

We are concerned that although Ofgem has produced a methodology for assessment of other criterion beyond the SEW, and has RAG rated these, it is not apparent how wider impacts have been given weight in Ofgem forming its minded-to position. We are also concerned that the overwhelming suite of evidence that shows the commitment to further interconnection from studies and stakeholders, including the MOU between the UK and Irish Governments[15] has been dismissed without adequate consideration (see Chapter 3).

[15] UK Government, Energy Transition, UK-Ireland Memorandum of Understanding

Ofgem has not appeared to act in line with its ICPR decision. It has failed to account for key strategic benefits (beyond the quantified benefits) including avoided wind curtailment, and the wider security of supply and climate change benefits specific to LirIC. It has also not considered the cumulative impact of its minded-to position, despite the clear evidence from the SSFP analysis, which shows the detriment to consumers of a low flexibility scenario – a likely consequence of Ofgem's minded-to position.

Avoided RES Curtailment

We note that NGESO's modelling also suggests that in the FA case, the addition of LirIC would lead to an annual level of avoided RES curtailment of between 1TWh and 2TWh, which is approximately 2.7GWh to 5.5GWh per day[16]. In the MA case, LirIC continues to lead to a reduction in RES curtailment of between 0.2TWh and 1TWh, which equates to approximately 0.5GWh and 2.7GWh per day[17]. NGESO's most recent "Beyond 2030" analysis shows under FES2023 this is likely to be even greater, of between around 3TWh to 5TWh of reduced curtailment[18].

This reduction in RES curtailment will help to ensure value for money from existing subsidy regimes such as the CfD, as well as ensuring value for money for GB's energy consumers through reducing the amount of money paid by NGESO to RES to be bid off the system (for energy balancing, rather than network constraints). It also will support enhanced investibility of renewables projects from the greater certainty in their ability to export energy, advancing the UK towards its net zero targets.

The wider benefit of flexibility should be considered and given weight compared to the small deficits in SEW (in the ARUP analysis corrected for the interconnector welfare allocation). We suggest that Ofgem considers the potential order of magnitude impact (£ billion) of this benefit, for example, by considering the lower cost of capital from higher certainty for developers (as per the Grant Thornton and LCP analysis for REMA) or the scale of benefits from flexibility noted in the SSFP analysis.

Increased security of supply for GB from UK resources

It is unclear how Ofgem's minded-to position considers the geopolitical insecurity that exists and the strategic value to GB consumers of maximising interconnection with its close neighbours, to increase resilience to exogenous shocks such as the invasion of Ukraine.

In particular for LirIC, it is not clear how Ofgem has assessed the level of "appropriate connection" to wider markets (as required in the SPS), or how Ofgem has appropriately engaged with the NI Authority to coordinate and consult to enable adequate interconnection between GB and NI, as specific duty on Ofgem. We would suggest there is significantly greater strategic value in maximising the utilisation of capacity and resources within the UK to ensure security of supply, compared to any other connected country. This strategic value of energy security to GB consumers does not appear to be acknowledged in Ofgem's minded-to position.

[16] Figure 86 of NGESO's Window 3 modelling report
[17] Figure 87 of NGESO's Window 3 modelling report
[18] https://www.nationalgrideso.com/document/304771/download (page 35, Figure 27)

Coordinating investment to achieve UK Climate Change targets and carbon budgets at lower cost

Maximising the use of all UK resources to achieve UK Climate Change targets is likely to lead to lower costs imposed on GB consumers compared to isolated decisions being made in GB and NI separately. By the simple example of minimising curtailment of wind production for either nation will reduce the subsidies required and allow greater RES capacity to be built for less. Coordination across the nations is in the GB consumer interest, reaching beyond that which a simplified estimate of social-economic welfare benefit study can capture. Ofgem should recognise the GB consumer interest is in the achievement of the UK Climate Change targets and carbon budgets at least cost.

Disbenefit from reduced system flexibility

Ofgem's minded-to position, to reject six out of seven interconnection projects in Window 3, represents a significant deviation from expectations. As a result, the Ofgem minded-to position may not only be misleading, in that it doesn't support Government policy ambitions, but may also be misrepresenting the cost to the GB consumer. If the expected level of interconnection is not achieved, there will be costs of, both direct and indirect to achieve the next viable pathway for the nations of the UK to achieve the climate change targets and carbon budgets.

The SSFP modelling demonstrates that in a Low Flexibility Scenario there will be an increase in the amount of renewable curtailment. Figure 7 below illustrates that in the high demand case, the low flexibility scenario results in around 40% of renewable generation being curtailed in 2050, this reduces to around 20% in the central scenario and 10% in the high flexibility scenario. Less renewables curtailment from increased flexibility leads to consumer savings.

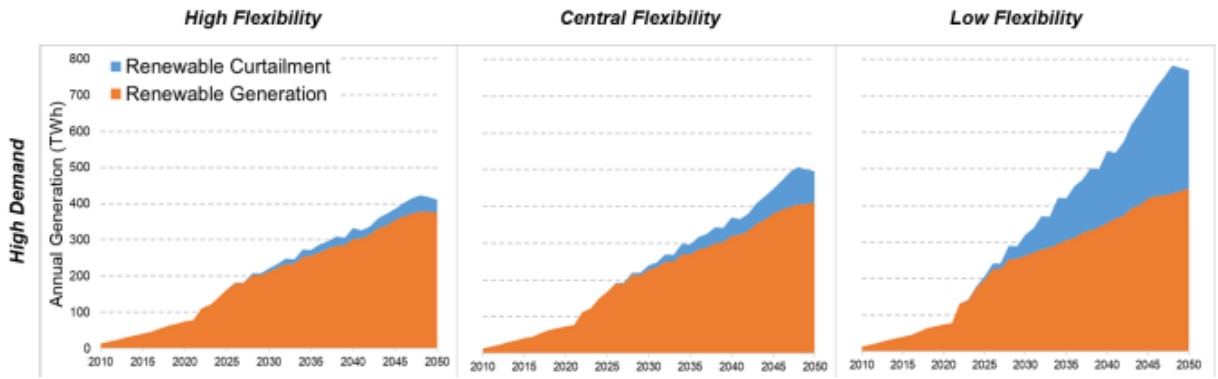

Figure 7 - Smart Systems and Flexibility Plan 2021, Renewable generation and curtailment across all scenarios

Before making such a decision, to reject the majority of projects, Ofgem must consider the impact of significantly reduced flexibility (a feature not explicitly reported by ARUP or NGESO) and the cost of providing the alternative flexibility sources to avoid significant RES curtailment that will appear as system costs. These alternative sources of flexibility are generally less mature compared to interconnection, many yet to be deployed commercially at scale, and some requiring a regulatory framework themselves to be in place (e.g. long duration storage). These issues create significant execution and delivery risk to providing the required flexibility onto the system creating uncertainty.

Similar to REMA, Ofgem is introducing uncertainty that the expected flexibility to absorb renewables will be available. This is likely to feed back into the upcoming Contract for Difference Auction Rounds strike prices. Analysis carried out by Grant Thornton and LCP Delta for the Government[19], (see Figure 8) to support REMA shows how uncertainty for developers translates into a rise in cost of capital that would increase capital costs and create a significant consumer detriment through the strike prices or other support mechanism required. A cost that will be far in excess of the small welfare losses associated with the LirIC project.

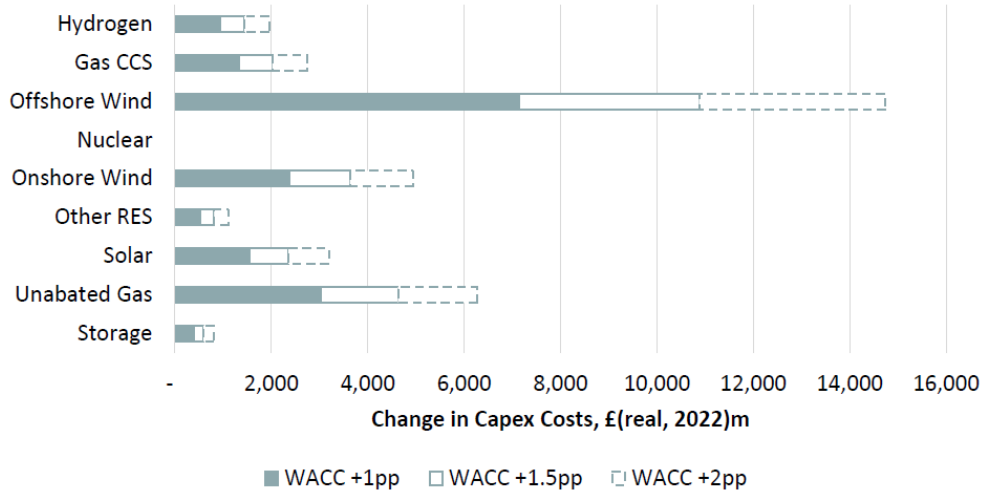

Figure 8 - System Benefits from Efficient Locational Signals, Changes in Capex costs (NPV) in the DESNZ Net Zero higher scenario for various levels of WACC percentage point increase

In summary, it is not clear in the minded-to position how Ofgem has considered, and factored into their position, the LirIC specific wider benefits or the wider implications for GB consumers of their decision leading to a reduced level of flexibility in the system. The minded-to position, not to accept six out of seven interconnection projects, will lead to an interconnector landscape which is similar to the Low Flexibility Scenario in the SSFP.

2.4 Multiple studies and stakeholders expect further interconnection between GB and SEM

The market modelling undertaken by ARUP for Ofgem has been shown to be flawed. It would, therefore, be prudent to consider and give weight to evidence from other studies of the benefits of the interconnection between GB and SEM, to complement and provide a sense-check ahead of any decision.

Modelling undertaken by LCP for LirIC and submitted as part of the W3 submission, LCP replication modelling of ARUP's W3 Modelling for LirIC, both consistently show substantial GB SEW benefits. The strategic need for further interconnection between GB and the SEM has also been recognised in a number of independent studies to date.

These independent studies provide further evidence as to the wider strategic benefits to consumers of interconnection, including in relation to security of supply, decarbonisation and flexibility. It would appear Ofgem has not considered any of this wider evidence in coming to its minded-to position, and it explicitly

[19] System benefits from efficient locational signals (publishing.service.gov.uk)

states that *"Beyond the finalisation of the methodology, the developer modelling studies are not used further in the assessment process of the IPA."*

We include below, for Ofgem's consideration, a non-exhaustive list of relevant independent studies which support the development of further interconnection between GB and SEM.

NGESO – Interconnector Analysis March 2024

In NGESO's Interconnector Analysis[20], published in March 2024 as part of the suite of documents making up the Beyond 2030 report, the island of Ireland is clearly identified as being in the optimal path. More explicitly, an interconnector (labelled interconnector "M" in Figure 2 of NGESO's report) between the SEM and GB Zone 1 (above the B6 boundary where LirIC shall connect) is identified in the optimal path in all four FES scenarios.

The report also states that *"For Leading the Way, Consumer Transformation and System Transformation, the winning study case for iteration 1 is Ireland Zone 1. The study case produces high levels of welfare, particularly in Leading the Way and Consumer Transformation"* and that *"…for nearly all study cases for all four FES scenarios, interconnectors to the electricity market in Ireland and Norway result in constraint savings."* In simple terms, NGESO's Interconnector Analysis indicates that of all the possible locations and markets to connect a new interconnector from GB to, the preferred location of the next interconnector should be between Scotland and Northern Ireland, where the LirIC project is located.

ENTSO-E TYNDP 2022

The latest European wide TYNDP process in 2022, which evaluates the needs for greater interconnection for the SEM as part of the EU Internal Energy Market, demonstrated the increasing need for interconnection between GB and SEM rises from 1450MW in 2030 to nearly 2000MW by 2040. The LirIC project is confirmed in the list of projects admitted in the TYNDP2024 by European Network of Transmission System Operators for Electricity (ENTSO-E) (project number 1040)[21].

SONI – Draft Transmission Development Plan for Northern Ireland 2023-2032

In Northern Ireland, SONI's Draft Transmission Development Plan for Northern Ireland 2023-2032[22] noted, "Changes in Northern Ireland's Interconnection - UK policy recognises the economic and technical benefits associated with increased interconnection and therefore seeks to promote interconnection between Great Britain, Northern Ireland, and Ireland's transmission systems." Additionally, they recognised the potential for new interconnection to Scotland, representing an effective benefit to UK collectively.

Department of the Environment, Climate and Communications – National Policy Statement on Interconnection 2023

In summer 2023 the Department of the Environment, Climate and Communications in the Republic of Ireland (DECC) published their National Policy Statement on Electricity Interconnection[23], supported by a study undertaken by DNV on the impacts of increased interconnection on achievement of Ireland's 2030 and post-

[20] NGESO Interconnector Analysis, March 2024
[21] TYNDP 2022 Project Collection (tyndp2022-project-platform.azurewebsites.net)
[22] Draft Transmission Development Plan Northern Ireland and SEA 2023-2032 | SONI Consultation Portal

[23] DECC, National Policy Statement on Electricity Interconnection 2023

2030 climate and energy objectives[24]. This study identified further interconnection with GB as being justified from the developer and societal perspectives.

Department of the Environment, Climate and Communications – Future Framework for Offshore Renewable Energy 2024

DECC's Future Framework for Offshore Renewable Energy Policy Statement[25], published May 2024, considered analysis of additional interconnectors with GB up to 16.7GW to facilitate the potential increase of Offshore Renewable Energy. It recognises the need to essentially double the amount of interconnector capacity to GB (1.8GW to 3.3GW) between 2030 to 2040 under all scenarios.

EirGrid and SONI's Tomorrow's Energy Scenarios 2023

In May 2024, EirGrid and SONI published the Final Report for Tomorrow's Energy Scenarios 2023 (TES 2023)[26]. This report includes their latest thinking with respect to long term energy scenarios for Ireland and Northern Ireland, as well as considering what that could mean for the electricity system supported by different technologies, including interconnection.

The TES 2023 foresees a need for *"significant increases in electricity interconnection to continental Europe and Great Britain".* The TES 2023 has additional interconnection as a feature of all scenarios, and the table below outlines the capacities for each scenario for each year and between which jurisdictions. It can be seen that for all scenarios[27] there is an expectation that there will need to be additional interconnection capacity between NI and GB (bottom row of the table), from 1300MW to 3200MW depending on the scenario modelled.

Table 7.3: Interconnection capacities (MW)

	Self-Sustaining				Offshore Opportunity				Constrained Growth				Gas Evolution			
	2035	2040	2045	2050	2035	2040	2045	2050	2035	2040	2045	2050	2035	2040	2045	2050
IE-NI	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
IE-GB	1,750	1,750	3,250	3,750	2,600	5,100	5,750	5,750	1,750	2,250	2,450	2,450	1,900	2,200	2,250	3,200
IE-CE	1,400	1,400	3,750	3,900	2,650	3,200	5,900	7,400	700	1,400	1,400	1,400	2,150	2,750	3,400	3,400
NI-GB	1,300	1,600	2,200	2,200	1,650	2,500	2,900	3,200	1,200	1,800	1,850	1,900	1,400	1,500	1,500	2,100

Figure 9 - EirGrid and SONI's Tomorrow's Energy Scenarios 2023, Interconnection capacities

[24] DNV & Cornwall Insight for DECC, Impacts of increased electricity interconnection on achievement of Ireland's 2030 and post-2030 climate and energy objectives (February 2023)

[25] DECC, Future Framework for Offshore Renewable Energy (May 2024)

[26] EirGrid and SONI, Tomorrow's Energy Scenarios 2023 Final Report (May 2024)

[27] The results in the table account for interconnectors currently under development (e.g. GreenLink) as well as a second interconnector from Ireland to France that was identified as a system need in EirGrid's Shaping our Electricity Future Roadmap V1.1.

UK-Ireland Memorandum of Understanding (MoU)

In September 2023 a UK-Ireland Memorandum of Understanding (MoU) was agreed to support the energy transition, offshore renewables, and electricity cooperation between The Department of the Environment, Climate and Communications of the Government of Ireland (DECC) on the one part and the Department for Energy Security and Net Zero of the Government of the United Kingdom of Great Britain and Northern Ireland (DESNZ)[28]. The explicit purpose of this MoU was to facilitate closer cooperation to promote, amongst other things, the development of electricity interconnection. The exploration of the potential benefit of further electricity interconnection was identified as a priority area. Ofgem's mind-to position does not support this strategic intent.

2.5 Ofgem's Maturity and Deliverability Assessment

The level of maturity and deliverability of a project, in turn representing its ability to support the achievement of net zero and climate budget targets, should be appropriately weighted in Ofgem's assessment of projects.

We note that the LirIC project is rated as green for all criteria in the "Maturity and Deliverability Assessment" with the exception of three, which are categorised as amber. We address each of the amber rated criteria in turn below, providing further evidence as to why these should be amended from amber to green, also summarised in the Table 4 below.

Table 4 - Summary of justification for amended RAG ratings for LirIC's deliverability and maturity assessment

Criteria	Ofgem minded-to position RAG rating	Justification for amended RAG rating
Project Plans	*"Ofgem understands that since LirIC's submission, the developer has been engaging with NGESO to update LirIC's connection agreement in GB for connection in the year 2032. This is a considerable delay to the original submission and Ofgem note that connection in the year 2032 leaves no room for further delay to the project's development. Ofgem, however, is assured by the developer's submitted material overall that connection in the year 2032 is likely."*	The new connection date for Hunterston is later than the original, however it gives LirIC ample additional time to complete all the necessary outstanding development activities to deliver the project to a 2032 connection and be fully operational soon thereafter. In addition, the risk profile for the project is significantly improved, and there is no evidence of material risk to the Hunterston 2032 connection date being realised.
Justification for chosen connection location, capacity and design	*"LirIC's application describes and explains the benefits of options being explored for the project's configuration, including*	We have submitted an updated "LirIC Connection Recommendation Note", deemed equivalent to a CION,

[28] Energy transition, offshore renewables and electricity interconnection cooperation: UK - Ireland memorandum of understanding (September 2023)

	coordinated options. The technical optioneering in the application conducted by the developer is robust and considers well the most economic and efficient connection for the project."	which confirms that Hunterston is the recommended connection location by 2032.
Financing Strategy	*"LirIC's financing strategy is based on a planned project finance structure. Limited detail was provided of the proposed financing, although reference was made to expectations of the project's financing structure matching the Greenlink and Neuconnect financing precedents in the interconnector sector. The financing plan was not supported by letters from potential investors in the project or from potential lenders."*	Development phase: we can confidently state that the Transmission Investment Group is willing and has the adequate resources to deliver this project. Construction phase: Aside from IPA evidence (already submitted), we would note that the investment proposition, and the financing structure for the project, would be dependent on the project business case which is largely dictated by the regulatory treatment of the project.

Project Plans

We note that Ofgem's minded-to consultation states, *"Ofgem understands that since LirIC's submission, the developer has been engaging with NGESO to update LirIC's connection agreement in GB for connection in the year 2032. This is a considerable delay to the original submission and Ofgem note that connection in the year 2032 leaves no room for further delay to the project's development. Ofgem, however, is assured by the developer's submitted material overall that connection in the year 2032 is likely."* The rating for this criteria was marked as amber by Ofgem; however we consider it should be amended to be green for the following reasons.

The grid connection date and location has changed for LirIC from the original IPA submission (Kilmarnock South in 2028) to Hunterston East substation in 2032, as confirmed by NGESO in their LirIC Connection Recommendation note of 9th April 2024 (Annex 4). The formal grid connection from NGESO is due by 2nd July 2024.

This new connection date for Hunterston may be later than original connection date for Kilmarnock South, however we are unclear why Ofgem has considered this as justification to grant an "amber" rating. The later date gives LirIC ample additional time to complete all the necessary outstanding development activities required to deliver the project to programme for a 2032 connection, and to be fully operational soon thereafter.

Not having certainty on the connection location and date, the outputs of the HND process and Ofgem's determination were key risks when making the original IPA submission. Now that the Ofgem determination process has concluded, and the NGESO Post-HND Recommendation received, these key risks have been eliminated, and therefore are no longer relevant for consideration.

Given the significantly improved risk profile, we would advocate that the project plan RAG rating should be amended to green, on the basis that, at this stage, there is no evidence of material risk to the Hunterston 2032 connection date being achieved.

The principal risk to the project connection progressing on time, as already noted in the submission, is gaining clarity on the regulatory arrangements in GB.

Justification for chosen connection location, capacity and design

We note that Ofgem refers to the Connections and Infrastructure Options Note (CION) provided by NGESO as being outdated, therefore impacting Ofgem's ability to use this information for its assessment. We also note Ofgem states *"we have discounted evidence derived from the CION which the developer would not have been able to obtain otherwise, and only assessed applications for this criterion in aspects that go as far as developers can control".*

Following further engagement with Ofgem on 19 April 2024 with respect to LirIC's amber rating for the "*Justification for chosen connection location, capacity and design*" criteria, Ofgem stated there was no further evidence LirIC could provide to support this criteria. Instead Ofgem was engaging with NGESO with respect to the CION. We are concerned that the evidence provided by NGESO to date appears not to have been sufficient to enable LirIC to gain a "green" RAG rating with respect to this criteria, therefore to improve LirIC's justification for the connection location, capacity and design we have sought to provide further evidence.

Therefore, we have provided an updated "LirIC Connection Recommendation Note", deemed equivalent to a CION, which confirms that Hunterston is the recommended connection location by 2032 (Annex 4).

Financing Strategy

Ofgem has rated the Financing Strategy criteria amber on the basis that, "*LirIC's financing strategy is based on a planned project finance structure. Limited detail was provided of the proposed financing, although reference was made to expectations of the project's financing structure matching the Greenlink and Neuconnect financing precedents in the interconnector sector. The financing plan was not supported by letters from potential investors in the project or from potential lenders."*

With respect to the development phase of the project, we can confidently state that Transmission Investment is willing and has the adequate resources deliver this project.

With respect to the construction phase of the project, aside from the information already submitted as part of the IPA consultation, we would note that the investment proposition, and the financing structure for the project, would be dependent on the project business case which is largely dictated by the regulatory treatment of the project.

Ofgem there must, amongst other things, before proceeding to its decision:

4. consider and give weight in the assessment to the value of interconnection in delivering flexibility
5. recognise and give weight to the strategic benefits specific to LirIC such that GB consumers interests in security of supply from UK sources
6. take account of the wide-ranging evidence of the strategic benefits of greater integration between GB and SEM
7. change the Maturity and Deliverability RAG rating of LirIC based on the additional evidence provided

3. Ofgem has not adequately taken into account specific duties that are relevant to LirIC

Given that LirIC is an intra-UK project, connecting Scotland with Northern Ireland, we contend that Ofgem's specific duties related to LirIC means it stands apart from all the other projects under consideration. Those relevant duties should have been specifically recognised in the minded-to position and in considering the appropriate cap and floor arrangement. Ofgem has not, in our view, adequately assessed the LirIC project in the context of its public law duties or the connecting market perspective.

3.1 Obligations to consult and cooperate with the NI Authority

Section 3F of the Electricity Act 1989 places obligations on Ofgem to consult and cooperate with the NI Authority (the Utility Regulator) in carrying out its regulatory functions wherever it sees fit. This explicitly includes cooperation to enable an adequate level of interconnection capacity between the nations. Our understanding, from our engagement to date, is that there have been limited discussions between the Authorities in this respect. In addition, we understand there has been no consideration of what arrangements would best enable adequate interconnection between these two jurisdictions in the UK. This is despite a number of studies (see chapter 2.4 above) evidencing that there is economic benefit of further interconnection between GB and NI.

The lack of any reference in Ofgem's minded-to position discussing obvious specific strategic benefits of LirIC - such as maximising the use of UK resources (above any other connected country) for mutual security of supply for GB and NI - means it is unclear how the duty to coordinate to enable adequate interconnection between the nations has been fulfilled. The assessment appears to overlook the geopolitical insecurity that exists and the clear value to GB consumers of maximising the use of indigenous UK energy sources wherever possible. This lack of consultation could imply a failure to meet the duty in section 3F of the Electricity Act 1989.

Our engagement with the Utility Regulator regarding the function of a Cap and Floor arrangement has examined some of the features that may help or hinder how adequate interconnection between GB and NI can be supported. Specifically, the way in which any support payments would be split between consumers in each country, given that it enables UK energy security and achievement of UK climate targets. In a typical arrangement the liability for the top-up falls 50:50 to each end of the interconnector. This would place a significantly higher burden per consumer household in NI compared to GB, simply because there are less than 3% of the number of households to recover the top-up revenue from. If it were ever to be needed (considered unlikely by Ofgem/ARUP and LCP) it would see a NI household bearing more than 30x the share (compared to a GB household) for intra-UK infrastructure that benefits all UK citizens. We would have therefore expected Ofgem, as part of its process, to have discussed such matters directly and in detail with

the Utility Regulator, in good time, before any minded-to position to understand how it could contribute to adequate interconnection between GB and NI. This does not appear to have been the case and would suggest that Ofgem has not taken a reasonable approach to its duties in this regard.

We also contend, in taking a strategic wider view of interconnection it was relevant for Ofgem to consider how any minded-to position may impact on enabling adequate interconnection between GB and NI. LCP's analysis for LirIC (submitted in the Window 3 application) as well as LCP's replication of ARUP's modelling split the SEW results into GB, NI and Republic of Ireland ("RoI"). The modelling by ARUP, for Ofgem, did not account for a split in SEM welfare results between NI and RoI. On request, Ofgem provided a "rough" calculation of the split of SEM benefits between NI and RoI to enable an overall view of the benefit of LirIC to the UK. However, the interconnector welfare was split on an arbitrary 50:50 basis, which is incorrect and is a further basic misunderstanding of how the benefits should be allocated. Based on the data provided by ARUP, LCP has sought to split the interconnector welfare in the correct way to understand the impact on UK results. This impact is outlined in the Figure 4 (Chapter 1.1), demonstrating that LirIC would bring a **net benefit to the UK of £0.4bn** in ARUP's modelling (when corrected for the error in interconnector welfare allocation).

In our view, it is apparent that Ofgem, in it's minded-to position, has not considered this net benefit to the UK or the strategic UK energy security benefit from LirIC, which might be reasonably expected given its duty with respect to consulting and cooperating with the Utility Regulator on enabling an adequate level of interconnection capacity.

3.2 Public Law Duties with respect to UK Net Zero targets and carbon budget

We are concerned that Ofgem has not adequately assessed the LirIC project in the context of Ofgem's recently changed public law duties. The *Energy Act 2023* entered into force on 26 December 2023 and changed the principal objective of GEMA, to protect the interests of energy consumers in GB, to include the Secretary of State's compliance with the UK-wide Net Zero targets and carbon budget. The referencing of the specific clauses of the *Climate Change Act 2008,* related to targets that cover the whole of the UK including NI, would appear to be relevant in considering the intent of this change. GB has an interest in all of the UK nations contributing and collaborating to minimize the overall cost of achieving Net Zero for the UK. The change would appear to have particular relevance when GEMA considers the benefits of an intra-UK electricity interconnector project. The expanded principal objective of GEMA complements the Net Zero statutory duties of the relevant NI departments under the *Climate Change Act (Northern Ireland) 2022* to reduce NI emissions. The LirIC project has not been adequately assessed in the context of Ofgem's changed public law duties.

Ofgem appears to be taking a narrow economic view of the GB consumer interest in the Secretary of State's compliance with the *Climate Change Act 2008*. This appears to be supported by the statement in paragraph 3.39 of Ofgem's minded-to position that "*Ofgem is aware of the projected impacts of the projects in connecting jurisdictions. However, for our decision making,* ***Ofgem only considers the impact on GB****, as a cap and floor regime is underpinned by GB consumers*". There is no explanation or reasoning in the minded-to position as to how Ofgem has specifically considered these interests in the context of the LirIC project connecting to Northern Ireland having regard to UK wide net zero obligations and carbon budgets. In common with the Smart Systems and Flexibility Plan and ICPR, we argue that the GB consumer interests are

more strategic and diverse than a simplified estimate of social-economic welfare benefit. For example, maximising the use of GB and NI renewable resources would also have the effect of the UK achieving net zero at lower cost, a benefit that would also accrue to the GB consumer (through reduced support payments). The recent change in duties would appear to have particular relevance in relation to facilitating decarbonisation as referenced in both GB and NI Smart Systems and Flexibility Plans.

In summary, Ofgem has specific legal duties with respect to its engagement with the NI Authority that are different to other connected counties, however, these is no evidence in the minded-to position that Ofgem has acted on these, considered the LirIC specific energy security or the strategic wider interest of GB consumer in achieving the UK climate change targets and carbon budgets at lower cost.

Ofgem therefore must, amongst other things, before proceeding to its decision:

8. reconsider how any minded-to position supports the enabling adequate interconnection and the UK energy security from improving sharing resources between GB and NI
9. reconsider the strategic benefit to GB consumers of achieving UK climate change targets and lower cost with greater interconnection to NI.