Guidance

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Cap and Floor Third Application Window and MPI Pilot Regulatory Framework – Guidance on our Needs Case Assessment Framework

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This document provides guidance on our needs case assessment framework ahead of the opening of the third cap and floor application window for new electricity interconnectors and the multi-purpose interconnectors (MPIs) pilot regulatory framework. This framework will be used to assess the needs case for proposed projects across both schemes during the Initial Project Assessment stage. We also provide guidance for applicants who plan to submit their own modelling study as part of their application. We have published a supporting report by Ove Arup alongside this document.

Both the third application window and the MPI pilot regulatory framework will be open for applications from **1st September to 31st October 2022.**

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Executive Summary

The Interconnector Policy Review (ICPR) and implementation

In August 2020, Ofgem launched a review of its regulatory policy and approach to new electricity interconnectors – our Interconnector Policy Review.[1] The ICPR and subsequent implementation support our continued ambition to enable investment in low-carbon infrastructure at a fair cost to energy consumers through our Low Carbon Infrastructure Strategic Change Programme.[2]

As a result of the review, we detailed in our ICPR decision that we will run a third application window for interconnectors alongside a multi-purpose interconnectors (MPIs) pilot cap and floor regulatory framework.[3] These investment rounds have the potential to contribute to the delivery of Government policy, such as the ambitions of achieving at least 18GW of interconnection,[4] and 50GW of offshore wind by 2030.[5]

In the first half of 2022, we have refined and implemented the principles outlined in the ICPR decision paper. Following external stakeholder workshops to develop specific aspects with industry, the cap and floor regime has been updated for the third application window to reflect the evolving interconnector investment landscape and build upon lessons learnt in previous windows. In addition, we have launched a MPI cap and floor pilot framework to reflect the complex nature of these hybrid projects.

Our updated needs case assessment framework

As part of the Initial Project Assessment (IPA) for the cap and floor regime, Ofgem conducts a cost-benefit analysis (CBA), where projects are assessed on their socioeconomic value, wider network and environmental impacts, and against the existing interconnector landscape. This ensures that projects are necessary, deliverable, and in consumers' interests.

The needs case framework has been updated for the third application window following a review by advisors from Ove Arup, to account for whole-system impacts such as an interconnector's impact on the existing transmission system, security of supply, and other hard-to-monetise impacts. These new indicators align Ofgem's approach in some areas more

[1] Open letter: Notification to interested stakeholders of our interconnector policy review
[2] 2022/23 Ofgem Forward Work Programme (see Part 4: Low Carbon Infrastructure)
[3] Interconnector Policy Review - Decision
[4] Energy white paper: Powering our net zero future - GOV.UK (www.gov.uk) (see page 80)
[5] British energy security strategy - GOV.UK (www.gov.uk)

closely with the European Network of Transmission System Operators for Electricity (ENTSO-E) modelling standards. This updated framework will also apply to the MPI pilot regulatory framework, and we will collaborate with applicants to ensure that the modelling adequately reflects the bespoke and complex nature of MPIs, given differences in project structure and operation from traditional interconnectors.

Next Steps and Applicant Guidance

We will be accepting applications in tandem for the third application window and MPI pilot regulatory framework, between **1st September and 31st October 2022.**

As part of their submissions, applicants will be required to provide information that will be used in our CBA analysis; hard-to-monetise impacts will be informed by qualitative information that applicants submit, and where applicable, applicants may also include information as to whether they expect their project will provide ancillary services to the grid. MPI pilot applicants will need to indicate whether they expect their project will be developed under the Interconnector-led or OFTO-led model and their initial view on whether their MPI project would work more effectively under the home market or offshore bidding zone arrangements.

Unlike previous application windows we do not require developers to submit their own CBA modelling studies. However, we recommend that developers submit their own CBA modelling studies where available.

After the closing of the application window, we will confirm which projects have met the eligibility criteria and will progress to our IPA assessment stage. In late 2022 we will conduct a modelling workshop with developers to consult on and discuss the scenarios and assumptions to be used for Ofgem's CBA.

1. Introduction

1.1. The cap and floor regime, which has been in place since 2014, is the regulated route for interconnector development in GB.[6] The regime incentivises interconnector development by limiting developers' exposure to electricity market price risk. Interconnectors can offer significant benefits to existing and future customers - they can lower consumer bills by importing cheaper electricity from abroad, they can reduce renewable curtailment, and they can support decarbonisation goals through utilising surplus intermittent renewable electricity from across jurisdictions. By opening further interconnector investment windows, Ofgem is enabling progress towards the Government's ambition to achieve at least 18GW of interconnection by 2030.

1.2. Ofgem ensures that regulated interconnectors are in consumers' interest, are delivered in a timely manner and at a low cost to consumers, because consumers ultimately underwrite projects through floor payments. As part of our Initial Project Assessment (IPA) stage, Ofgem has to-date run a CBA to determine the needs case of each project.[7] This CBA considers the social welfare of each project and assessment of project plans. In previous windows, developers were able to inform the assumptions and scenarios used in our CBA and also provided additional evidence by submitting their own CBA analysis as part of their application.

The Interconnector Policy Review (ICPR)

1.3. In 2020, Ofgem began a review of its regulatory policy and approach to new electricity interconnectors - our Interconnector Policy Review (ICPR). Following public consultation on the proposals of the four ICPR workstreams, we published a decision in December 2021.

1.4. In this decision, we concluded that further interconnection would be beneficial, but that we would explore adjustments to the cap and floor framework, to provide a simpler, more consistent and more flexible regime. We also decided to open an MPI pilot to trial the suitability of the cap and floor framework to this nascent asset class and understand how best to build a regime for the future.

[6] Cap and Floor Regime Handbook
[7] See the Pöyry (now AFRY) CBA reports for Window 1 and 2 projects Near-term interconnector cost-benefit analysis: Independent Report (cap & floor window 2) (ofgem.gov.uk), Cap and floor regime: Initial Project Assessment for the NSN interconnector to Norway | Ofgem

1.5. On the needs case assessment, the decision recognised that future windows would require targeting (by location, timing or capacity) to meet the evolving needs of the transmission network, ensure more strategic investment to meet Government ambitions, and to recognise the diminishing returns of each additional interconnector to the system.[8] We decided that the needs case assessment framework would require updating to ensure it was fit for purpose and accounted for wider, whole-system impacts. A future needs case assessment framework would consider system operability, decarbonisation, flexibility and security of supply, alongside the traditional socio-economic model.

1.6. More detail on the ICPR and its implementation can be found in our Application Guidance for the Third Cap and Floor Window for Electricity Interconnectors[9], and our Multi-Purpose Interconnectors Pilot Regulatory Framework publication[10].

Implementation of the ICPR and Development of the Needs Case Framework

1.7. Since January 2022, Ofgem has refined and implemented the principles outlined in the ICPR decision. We held five interactive stakeholder workshops throughout Spring 2022 on the details of the regime and needs case framework applicable to both the third window and the MPI pilot (hereafter 'third investment round' when referred to in tandem). The response to the workshops was broadly positive. Many stakeholder suggestions focused on the weighting of different impact categories, the scenarios to be used, and how best to develop the hard-to-monetise categories.

1.8. During our implementation period we procured advisors from Ove Arup to develop an updated methodology for our needs case assessment (hereafter 'the Arup report'). They have provided suggestions on how to embed new quantifiable indicators into the assessment effectively, such as network operability impacts and carbon impacts. Their work also draws upon best modelling practice across other sectors, and identifies the roles and responsibilities of different parties in the assessment process. Their report is published alongside this guidance. Our focus in this publication is identifying the main changes to the needs case framework from that used in previous windows, to enable developers early sight of a key aspect of Ofgem's updated decision-making processes

[8] See also the consultation for workstream 2: socio-economic modelling, for the Interconnector Policy Review Interconnector policy review: Working paper for Workstream 2 – socio-economic modelling | Ofgem, and Afry's future interconnection scenarios work conducted in 2020 Ofgem interconnector policy review – independent report

[9] Application Guidance for the Third Cap and Floor Window for Electricity Interconnectors | Ofgem

[10] Multiple Purpose Interconnectors Pilot Regulatory Framework (ofgem.gov.uk)

for the cap and floor and MPI pilot regimes. The Arup report also makes longer-term recommendations around the potential for a Future System Operator to perform needs case assessment analysis.

Your Feedback

1.9. Should you have any questions or comments regarding the content of this publication, please email Cap.Floor@ofgem.gov.uk. We will follow this publication with a modelling workshop at the start of the IPA stage in late 2022. At the workshop, eligible applicants will be able to provide their feedback on the assumptions, scenarios and counterfactuals that will be used in Ofgem's CBA.

Related Publications

Application Guidance for the Third Cap and Floor Window for Electricity Interconnectors | Ofgem

Multiple Purpose Interconnectors Pilot Regulatory Framework | Ofgem

Interconnector policy review: Working paper for Workstream 2 – socio-economic modelling

Interconnector Policy Review - Decision

Near-term interconnector cost-benefit analysis: Independent Report (cap & floor window 2) (ofgem.gov.uk)

Window 2 IPA Decision

2. The cap and floor needs case assessment framework for the third investment round

2.1. The purpose of the IPA is to identify whether eligible third investment round projects are likely to be in consumers' interests and should therefore be awarded a cap and floor in principle. The needs case assessment framework is the tool within the IPA to determine whether interconnector projects are in consumers' interests by understanding their holistic impacts. Projects may only be awarded a cap and floor regime in principle if the CBA indicates that the project provides benefits in the defined impact categories and Ofgem confirms this position. The updated needs case assessment framework methodology enables shortlisting if necessary. The assessment results will be communicated publicly through a consultation[11] for transparency and, following consultation, an IPA decision will be made for each project. We expect the IPA process to take approximately 6 months based on experience from previous application windows, although this may vary depending on the number of projects that come forward for the third investment round.

2.2. Below we outline some of the key recommendations we are taking forward from the Arup report, and provide more detail on areas particularly relevant to stakeholders.

Changes to the Needs Case Assessment Framework

2.3. In previous windows, significant price differentials and limited interconnection capacity to GB aligned incentives for consumers and developers whereby the new interconnectors would increase the import of cheaper electricity to lower prices for consumers, and developers would earn revenues from congestion rent. However, as interconnection capacity increases and more renewable generation is deployed, significant and structural price differentials are likely to reduce in the longer term, whilst short term volatility is likely to increase. This could reduce the consumer welfare benefits of more interconnection. However, interconnectors can deliver other significant benefits such as flexibility, system operability, security of supply and decarbonisation. Ove Arup has identified improvements to the previous needs case assessment framework regarding quantifying these other benefits. We are adopting Ove Arup's

[11] See an example of the IPA consultation for window 2 projects Cap and floor regime: Initial Project Assessment of the GridLink, NeuConnect and NorthConnect Interconnectors | Ofgem

recommendations for utilising new quantified indicators. This will better account for these benefits, identify trade-offs and improve the transparency of decisions.

2.4. Ove Arup has considered a range of different assessment frameworks such as the previous Ofgem framework, the ENTSO-E CBA guidelines, the Network Options Assessment (NOA) for Interconnectors, and the HM Treasury's Green Book. Based on Ove Arup's review of these, along with input from stakeholders' views at the ICPR and dedicated workshops, Ove Arup has recommended a new list of indicators. Chapter 3 in the Arup report includes a selection of quantitative and qualitative indicators describing seven standalone impact categories; social economic welfare (SEW), network costs, decarbonisation, system operability, flexibility, security of supply and hard to monetise indicators.

2.5. For each category, Ove Arup has identified a party responsible (see Table 1 for a summary). Below we focus on the main changes from the needs case assessment framework used in previous windows.

Socio-economic welfare impacts

2.6. Ove Arup recommends replicating the approach to SEW from Ofgem's consultant at our second cap and floor application window (Window 2). This compares the producer and consumer surpluses for both bidding areas, as well as the congestion rents between them, with and without the project. Project costs provided by developers will be netted off the SEW impacts. The SEW analysis will also provide inputs necessary for the calculation of the decarbonisation and security of supply indicators. The SEW indicator could be considered as a pass or fail indicator, but this could also depend on the performance of the other indicators.

Network costs

2.7. As in previous windows, the Connection and Infrastructure Options Note (CION), produced by the ESO to provide a connection offer for developers, provides the source of network costs. As stated in the IPA submission requirements, if developers are required to have a GB connection agreement, and if a CION is in place, they should include this in their IPA submission. This is a requirement for both the third application window and the MPI pilot regulatory framework. The CION will give us the necessary information to understand the impact of the project on the GB transmission system.

System operability and flexibility impacts

2.8. New indicators have been introduced in the Arup report for assessing system operability and flexibility, although the methodology recommended by Ove Arup is consistent with that previously used by National Grid Electricity System Operator (NGESO). NGESO will again be responsible for performing this analysis but through a more formalised, consistent and transparent process, giving the quantified indicators by project and where possible using the same scenarios as the SEW. In the case of the operability indicator, these seek to monetise the benefits that a new project could bring to the GB power system through the provision of ancillary services. Although the provision of these is currently voluntary, it will become increasingly important, under a net-zero landscape of increased electrification, for future interconnectors to provide ancillary services to the network. The flexibility indicator concerns the monetisation of the balancing actions through the balancing mechanism and ancillary services. As part of the IPA submission requirements, we have requested detail of any system operation benefits the project could provide, and any alignment with the relevant parts of the Grid Code, including ECC.6.3.19 'Grid Forming Capability'[12].

Decarbonisation impact

2.9. A series of decarbonisation indicators have also been added to the CBA, to estimate the change in CO_2 emissions that occurs due to a new interconnector being developed. Carbon values are distinguished as both the market value of CO_2 and the societal value of avoided CO_2. The renewable energy sources (RES) integration indicator demonstrates the additional renewable energy that is made available to the system as a result of the interconnector, and how the interconnector can reduce congestion and curtailment of existing renewable energy on the system. Finally, an indicator that assesses carbon emission impacts of the interconnector over a wider geographic area beyond GB has been incorporated. Information on the methodology for these indicators can be found in Chapter 3.4.1 of the Arup report.

[12] THE GRID CODE (nationalgrideso.com). Within the Application Guidance for the Third Cap and Floor Window, and the Multi-Purpose Interconnectors Pilot Regulatory Framework, this section of the Grid Code was referred to as GC0137. At the time of publication, this section of the Grid Code was a proposed modification awaiting implementation, labelled GC0137. The updated reference to 'Grid Forming Capability' reflects the modification's incorporation into the final Grid Code.

Security of supply

2.10. This is a new standalone indicator, previously dealt with in a hard-to-monetise impact category. Ove Arup has recommended an approach based on a similar monetisation provided by ENTSO-E CBA guidelines in their Adequacy to Meet Demand Benefit (B6).

Hard-to-monetise impacts

2.11. Compared with previous windows, we are now aiming to monetise a number of impacts that were previously deemed hard-to-monetise such as ancillary services, security of supply and decarbonisation. The hard-to-monetise areas proposed by Ove Arup have less directly tangible societal value or no clear market value, and are composed of; environmental, landscape, noise and local community impacts. Such impacts are important to capture because they can influence whether an interconnector proposal is successful when considered against planning and environmental policy. This will also help to shape our views on project maturity and deliverability. Ofgem's remit does not involve planning and environmental policy, however Ofgem's principal objective[13] is to act in consumers' interests. In carrying out its regulatory functions, Ofgem is required to have regard to the effect on the environment of activities connected with operations of electricity interconnectors.[14] As such, Ofgem should have sight of any potential issues that may be of concern to the public to enable us to consider all impacts of delivering a new interconnector. Arup has recommended the use of Red-Amber-Green (RAG) ratings for the hard-to-monetise impacts that will be assigned by Ofgem. Further details on the methodology and the information the developers should provide for these indicators can be found in Table 7 of the Arup report.

Relevant parties

2.12. We agree with Ove Arup's proposals on the most appropriate parties to conduct the analysis for the CBA - see Table 1 below. Information provided by the developer in the IPA submission will be used in most of the indicators – see Appendix 1. From the IPA submission, project information, such as technical design, cable route, connection location and capacity, will be used in the calculation of the SEW indicator amongst other

[13] As per the terms of Section 3A of the Electricity Act
[14] As per the terms of Section 3A (5)(c) of the Electricity Act

indicators. Using this and other assumptions (see Section 3) Ofgem's consultants will perform the SEW, decarbonisation and security of supply analysis.

2.13. From each project's CION, our consultants will extract evidence to demonstrate the network costs of the project. Grid Code alignment, if applicable, along with other design evidence will provide information for the system operability indicator. NGESO will run the analysis on the new system operability and flexibility indicators as they hold the necessary data, expertise and modelling tools for this type of analysis. Developers should provide information themselves on their project's hard-to-monetise impacts as part of their IPA submission.

Table 1: Indicators to be used in Ofgem's IPA CBA (see Table 5 in the Arup report for additional detail)

Category	Indicators	Units	Party conducting analysis and data source
Socio-economic welfare (SEW)	Consumers SEW	£m/y	Ofgem's consultants from SEW market modelling
	Producers SEW	£m/y	
	Interconnectors SEW	£m/y	
	Total SEW	£m/y	
Network costs	Onshore works	£m/y	Relevant TO, information extracted from CION
System Operability	Frequency stability	MW/h	NGESO from market and network modelling. Alignment with Grid Forming Capability requirements within the Grid Code
	Frequency response	£m/MW/h	
	Voltage stability	MVar	
	Reactive response	£m/MVar	
	Black start	£m/y	
Flexibility	Balancing market impacts	£m/y	NGESO from market and network modelling
Decarbonisation	CO_2 reduction (SEW)	£m/y	Ofgem's consultants from SEW market modelling
	CO_2 reduction (societal value)	£m/y	
	RES integration (avoided RES spillage)	MWh/y	
	RES integration (additional RES capacity)	MW	
	Overall decarb	t	
Security of Supply	Cost of EENS	£m/MWh	Ofgem's consultants from SEW market modelling

Category	Indicators	Units	Party conducting analysis and data source
Hard-to-monetise impacts	Environmental impact	Qualitative	Developers provide data through IPA submission, to be analysed by Ofgem
	Local community impacts		
	Noise/Disturbance		
	Landscape		
	Other		

Developer requirements for CBA submission

2.14. Unlike previous windows we do not require developers to submit their own CBA modelling studies. However, whilst this is optional for the third investment round, we recommend that developers provide their own CBA where available. Submitting a CBA provides developers with a chance to present their own analysis within their application, and provides an opportunity to present and justify different approaches. It is important to note that this analysis will be complementary to Ofgem's own CBA used at the IPA stage, and will not be used as a replacement.

2.15. Regarding information required from the developers for Ofgem to perform our own CBA, in line with Ove Arup's suggested assessment framework, the details are listed in the IPA submission information in the third window application guidance. These will primarily consist of project information, project costs, network costs (CION), alignment with Grid Code 'Grid Forming Capability' provisions where applicable, and information on expected hard-to-monetise impacts.

Weighting and Ranking

2.16. During our stakeholder workshops, developer feedback suggested it was important to understand how Ofgem might weight indicators and rank projects against each other within the analysis. During the needs case assessment, projects will firstly be assessed individually on whether they have a positive, negative or marginal impact for each category. Subsequently they will be assessed against each other to determine which project can deliver the best outcome for each category. Projects can then be ranked based on this assessment, subject to what the assessment shows. Projects will be assessed against each other regardless of capacity, length or location, and their ranking at this stage through the CBA does not determine an IPA outcome.

2.17. We have opted not to use a weighted scoring system, to uphold Ofgem's discretion to make a decision on eligible projects and to ensure outcomes are well-justified. Ofgem

will base decisions on a balance of the CBA against other factors, such as maturity and deliverability. Ove Arup have provided two possible example approaches for shortlisting in the needs case assessment framework; key criterion, where Ofgem chooses one high priority criterion in which a project should excel to be awarded an IPA, and minimum requirements, where Ofgem chooses projects that meet a minimum standard in certain criteria. At this stage, Ofgem does not have a preference, although all indicators are ex ante considered relevant. For more detail and to see examples please see Chapter 4 of the Arup report.

MPI needs case assessment

2.18. We are adopting Ove Arup's recommendation that the same indicators for assessing standard point-to-point interconnectors are applicable to MPIs, as they also capture the potential impacts of this new asset type. The modelling approach for MPIs should use the same scenarios, assumptions, sensitivities, time horizon, interconnector baseline and modelling tools as for standard point-point interconnectors. The way this modelling for MPIs is conducted will require careful consideration to accommodate different project configurations and may therefore differ from the modelling approach to standard interconnectors. Collaboration between Ofgem, Government, MPI-relevant stakeholders and developers on a project-by-project basis will be necessary to determine the regulatory, commercial and market arrangement aspects of the assessed project, which in turn will shape the modelling of its impacts.

2.19. MPI developers should share their preferred technical approach and market configuration in their IPA submissions and/or at the modelling workshop. In doing so, developers will be expected to present their most beneficial and feasible option among the alternatives considered - indicating whether they think their MPI should be an OFTO-led or IC-led project, other technical details of their offshore generation asset and transmission asset, and their initial view on whether the MPI project would work more effectively under the home market or offshore bidding zone arrangements.

2.20. In relation to the one-way-reopener mechanism, introduced in our guidance document for the Multi-Purpose Interconnectors Pilot Regulatory Framework, we recognise the flexibility required in the development of MPIs by enabling eligible developers, who can no longer progress their projects as an MPI, to transition into the third application window as a standard point-to-point interconnector. We expect that a material project change such as this transition may have a different impact on consumers, which might need to be assessed anew. Such a needs case assessment will be subject to the same indicators and modelling approach recommended within the Arup report.

3. Supplementary guidance for developer-led modelling studies

3.1. As stated in our application guidance for the third window, and taking on board Ove Arup's recommendation in their independent report, we recommend that developers provide a recent CBA as part of their application, although this is not mandatory submission material for this window. By submitting their own cost-benefit analysis, developers have a chance to present and justify their own scenarios and methodologies to Ofgem, which will increase the availability and diversity of information available to us, as we consider the needs case for projects. It is important to note that this analysis will be complementary to Ofgem's own CBA, used at IPA stage, and will not be used as a replacement.

3.2. Although we welcome diverse approaches to the use of scenarios and counterfactuals, in the following sections we outline what we consider current best practice. Ofgem could, for instance, agree to run specific sensitivities, create additional scenarios, or use specific datasets for certain inputs (eg.: weather years). Ofgem could present this complementary information in the relevant consultation documents, providing our opinion on which information was considered in the SEW analysis.

Scenarios and assumptions

3.3. Developer-led CBAs should take the form of a quantified modelling study that disaggregates benefits for different groups, supporting the qualitative evidence submitted along with their application where appropriate. We recommend this study be undertaken against a plausible and justified range of scenarios for generation mix, demand, weather pattern variability, and other key drivers of trading between interconnected countries. This should include a reasonable view of other interconnectors going ahead. Developers should consider the latest national scenarios in relevant countries. Ove Arup has suggested taking the Future Energy Scenarios (FES) produced by NGESO and pairing them with the FES national equivalent for connecting markets, or the scenarios set out in the ENTSO-E Ten Year Network Development Plan (TYNDP).[15]

3.4. Modelling should be undertaken against high and low sensitivities and/or scenarios for future interconnection to GB (ie presenting benefits of their project if it is one of a few

[15] https://2022.entsos-tyndp-scenarios.eu/

further interconnectors, and similarly when there is a significant increase in cumulative GB electricity interconnection).

Modelling approach

3.5. The modelling should cover a number of spot years as a minimum, covering the expected duration of the regime – such as 2030, 2035, 2040, 2045, 2050 and 2055. Developers could provide a full annual breakdown of benefits where this supports the case for the project. We also recommend submission of overall figures of the net present value of projects, based on interpolation between spot years where necessary, displaying headline benefits of the interconnector for GB as a minimum and for Europe as a whole where possible.

3.6. When discounting project benefits, developers should follow the HM Treasury Green Book's guidelines when selecting the discount rate.

3.7. The CBA should consider the social welfare benefits against the projected costs of the interconnector. This includes development, capital and operating costs. Developers' CBA studies should also incorporate the costs of any necessary direct onshore reinforcement required in the two connecting markets, and any projected increase or decrease in constraint costs as a result of their connection to national transmission systems.

3.8. We expect developers to provide analysis supporting the social welfare benefit of their project, and disaggregation of benefits, costs and risks between consumers, interconnectors and generators in GB and other key countries. This should also seek to distinguish between key types of costs and benefits, as a minimum separately showing impacts as a result of changes in wholesale energy prices and any cap or floor payments.

Sensitivities

3.9. Relevant sensitivities, such as potential cost over-runs or dependencies of project delivery on particular policies, should be considered. As part of these sensitivities, it would be useful for developers to consider the benefit of their project if the GB carbon price (including the Carbon Price Floor) is the same as the EU carbon price to demonstrate the benefits provided by interconnection that aren't driven by carbon price differentials.

3.10. We expect developers to reflect project uncertainties and risks in their quantitative CBA. However, where this is not possible, developers may submit a qualitative description of what they consider to be the most relevant risks and uncertainties for their project. This should support the social welfare analysis and CBA.

3.11. We expect this will also highlight any uncertainties on which project progress would likely be conditional – for example, if the investment is reliant on a particular minimum level of remuneration beyond that provided by the market, if it is dependent on certain technology being sufficiently proven, and/or if the procurement is tied to other transmission projects between non-GB markets. Developers may also wish to highlight potential planning risks where this is not sufficiently covered in their project plans.

Additional areas that could be considered by developers

3.12. Developers may submit a competition assessment, where they expect that their project will bring enhanced competition-based benefits and liquidity to the wholesale market in either GB or the connecting market, where this supports the needs case for their project. For example, this may apply where a project can provide benefits to consumers through increased operational efficiency of the electricity market. However, given the likely capacity of any interconnector relative to the GB wholesale market, we do not view this as a necessary part of the CBA modelling submitted.

3.13. Developers are welcome to highlight other possible areas such as the security of supply resilience of the GB system provided by high voltage direct current connections, as well as any other security of supply concerns such as the risk of displacement of domestic generation due to cheaper imports from abroad.

4. Next Steps

4.1. We will host a modelling workshop in late 2022, after the closing of the application window, to consult developers and other stakeholders on the particular parameters and assumptions of the CBA. Key topics for discussion will likely be:

- Consideration of which FES (for GB) to use and how to choose an equivalent national FES and/or scenario from ENTSO-E's TYNDP

- Other key assumptions, such as how to establish the interconnector baseline, commodity prices and weather.

4.2. We do not expect the workshop to reach consensus across all stakeholders. It will provide further transparency to stakeholders, and provide an opportunity to debate assumptions and reach an informed and coordinated view collaboratively for the scenarios.

4.3. Following from this publication, and in advance of the window opening, we will also publish analysis from NGESO and a high-level summary of our early engagement with the regulatory authorities from neighbouring states on the targeting of our window. This document will outline NGESO's analysis on interconnectors' impacts on the transmission system, and provide a high-level overview of the regulatory frameworks for interconnection in neighbouring states[16].

4.4. As a reminder, within the IPA submission developers must provide certain information that will assist with the CBA. Any information on hard-to-monetise impacts should be included, and if applicable, applicants should state if their project can provide ancillary services to the grid (see Section 2.8 and footnote 12).

4.5. Developers must submit their full application between 1st September and 31st October 2022. We welcome potential applicants to engage with us prior to the opening of the window, any questions can be sent to Cap.Floor@ofgem.gov.uk.

[16] This high-level overview of regulatory frameworks in connecting states does not constitute any advice nor do we expect the relevant stakeholders to rely upon this overview whilst developing projects or taking investment decisions. We expect developers and potential investors to properly engage with the relevant authorities in the connecting states, and to demonstrate a good understanding of regulatory approval frameworks in connecting countries to inform realistic project plans.

Appendix 1 - Table showing differences across the CBA framework between application windows 2 and 3

Table A: Information used by Ofgem from developers for the CBA and comparison with previous cap and floor application windows

Impact category	Indicator	Information used from developers	Change compared to W2
SEW	Consumers SEW	Project information such as justification of technical design, cable route, connection location, technology used for cable and converter stations, capacity, voltage, loss factors and project costs	No major changes compared to Window 2. Ove Arup suggests replicating the analysis conducted in the past and implementing the minor recommendations described in the Arup report Table 3 and Table 4.
	Producers SEW		
	Interconnectors SEW		
	Total SEW		
Network costs	Onshore works	Cost information for selected connection option from CION	No change. The CION process should be used also in the future to assess this category.
System operability	Frequency stability	Alignment with Grid Code ECC.6.3.19 'Grid Forming Capability'	No change. The ancillary services analysis by NGESO can be used to measure the impacts of a new project under this category.
	Frequency response savings		
	Voltage stability		
	Reactive response savings		
	Black start		
Flexibility	Balancing Market impacts	No information required	New standalone category. The assessment of constraint costs provided by NGESO can be used to measure the impacts of a new project under this category.
Decarbonisation	CO_2 reduction (SEW)	No information required	New standalone category. Indicators and methodologies required to measure the impacts under this category can be based on the ENTSO-E CBA guidelines (indicators B2 and B3).
	CO_2 reduction (Societal value)		
	RES integration (avoided RES spillage)		
	RES integration (additional RES capacity)		
	Overall decarbonisation		
Security of Supply	Cost of EENS	No information required	New standalone category. Indicators and methodologies required to measure the impacts under this category can

			be based on the ENTSO-E CBA guidelines (indicator B6).
Hard to monetise impacts	Environmental impact	As described in Table 7 of the Arup report	Minor changes. Ove Arup suggests maintaining this impact category, broken down in multiple indicators
	Local community impacts		
	Noise/Disturbance		
	Landscape		
	Other impacts		