

Final Project Assessment of the NSL interconnector to Norway

Consultation

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Overview:

This consultation provides our minded-to position on the Final Project Assessment (FPA) of the North Sea Link (NSL) interconnector to Norway (previously NSN).

We seek views on our conclusions at this stage, notably our cost assessment and the scope of the post-construction review.

Context

Electricity interconnectors can provide significant benefits to GB energy consumers. We confirmed our cap and floor regulatory regime in 2014 to provide a clear and transparent regulatory approach for the development of new electricity interconnector projects between GB and other countries.

This consultation provides our minded-to position on the Final Project Assessment (FPA) of the NSL interconnector to Norway (previously NSN). The NSL project is being jointly developed by National Grid Interconnector Holdings (NGIH) and by Statnett, the Norwegian transmission system operator. Our cap and floor regulatory regime applies to National Grid's 50% share of the cost and revenues of the project.

Following this consultation we will make our final decision on NSL's FPA. Subject to the outcome of the consultation process, we will provide provisional cap and floor levels and will modify NSL's interconnector licence to give effect to our decision. We will then confirm the final cap and floor levels for the project prior to operation at our post-construction review (PCR) stage.

Associated documents

Cap and floor regime: Initial Project Assessment for the NSN interconnector to Norway (December 2014)

<https://www.ofgem.gov.uk/publications-and-updates/cap-and-floor-regime-initial-project-assessment-nsn-interconnector-norway-0>

Decision on the Initial Project Assessment of the NSN interconnector to Norway (March 2015)

<https://www.ofgem.gov.uk/publications-and-updates/decision-initial-project-assessment-nsn-interconnector-norway>

The regulation of future electricity interconnection: Proposal to roll out a cap and floor regime to near-term projects (May 2014)

<https://www.ofgem.gov.uk/publications-and-updates/regulation-future-electricity-interconnection-proposal-roll-out-cap-and-floor-regime-near-term-projects>

Decision to roll out a cap and floor regime to near-term electricity interconnectors (August 2014)

<https://www.ofgem.gov.uk/publications-and-updates/decision-roll-out-cap-and-floor-regime-near-term-electricity-interconnectors>

Integrated Transmission Planning and Regulation project: Final Conclusions (March 2015)

<https://www.ofgem.gov.uk/publications-and-updates/integrated-transmissionplanning-and-regulation-itpr-project-final-conclusions>

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Executive Summary

Electricity interconnectors can provide significant benefits to GB energy consumers. We confirmed our cap and floor regulatory regime in 2014 to provide a clear and transparent regulatory approach for the development of new electricity interconnector projects between GB and other countries. This aims to incentivise commercial investment in interconnectors where this can benefit consumers.

This consultation provides our minded-to position on the Final Project Assessment (FPA) of the NSL interconnector to Norway (previously NSN). The NSL project is being jointly developed by National Grid Interconnector Holdings (NGIH) and by Statnett, the Norwegian transmission system operator.

Background and scope

The NSL project is a 1.4GW electricity interconnector between Blyth, Northumberland in England and Kvilldal in Norway. Our cap and floor regime applies to National Grid's 50% share in the NSL project.¹

The cap and floor regime is the regulated route for interconnector development in GB.² There are two main stages to our cap and floor regime – the Initial and Final Project Assessments (IPA and FPA). We assessed the needs case for the NSL project at the IPA stage and decided in March 2015 to grant the project a cap and floor regime in principle. This was based on our assessment that the project is likely to significantly benefit GB consumers and GB as a whole. This decision was subject to the costs of the project not materially increasing.

This document sets out our minded-to position on the FPA of the NSL interconnector. We aim to provide a clear view on NSL's proposed costs and to update the cap and floor levels accordingly.

What our assessment shows

NSL submitted its incurred and forecast costs to Ofgem at the end of December 2015, with information finalised in March 2016. We have assessed the economic and efficient costs for the capital expenditure (capex), which is made up mostly by three large contracts, the developer's project management costs, and some other smaller items such as site preparation work the developer is conducting itself and the hedging costs for the contracts.

We think that the project's firm costs (such as project management costs and the firm prices in supply contracts) are reasonable. The procurement process followed for

¹ National Grid NSN Link Ltd – or NGNSN – is the licenced entity on the GB side of the interconnector. This licensee is a part of National Grid's interconnector business, NGIH.

² Interconnector developers in GB have the choice to apply for our regulated cap and floor regime or to apply for the exemption route which exists via European legislation.

contracted costs (primarily the cable and converters) was generally efficient and the selection process was likely to have led to competitive bids.

The NSL project is exposed to a number of risks and uncertainties. These uncertainties include: provisional sums within the contracts; variation orders within the contracts; and risk-related cost variance that may occur during the construction period (which is not already covered in the contracts). Costs relating to risks and uncertainties will become clear by the time of the post-construction review (PCR), and may result in higher or lower total project costs.

We have provided clarity on the scope of our PCR and our principles for considering any risk-related cost variance. If such cost variations are deemed to be eligible for the PCR, and then assessed to have been efficiently incurred, these costs will be included in the final cap and floor levels.

Based on our cost assessment we think a total capex figure of £604m represents reasonable expenditure for the NSL interconnector at this stage. Of this figure, £58m is a placeholder for potential risk-related cost variance which will only be assessed at the PCR.³ This number could subsequently increase or decrease at the PCR stage. The total capex figure of £604m is approximately 13% lower than the developer's FPA submission of £697m. This also represents a reduction of 33% from the estimated costs of £900m provided for the IPA stage.

We propose setting a preliminary cap level of £94.2m and floor level of £53.0m for the project. These cap and floor levels are approximately 30% lower than those used at our IPA stage, which were approximately £140m and £75m. We think the project can therefore be reasonably expected to provide greater benefits to consumers than we expected at the IPA stage. However, we note that these cap and floor levels are not final and will only be finalised following our PCR assessment. These figures also include an application of interest during construction (IDC) to the spend profile as currently submitted.

We have provided our view on the final regime design for the project, which includes a confirmation of the key cap and floor regime features as well as financial parameters that will apply to NSL project. These have been set at the date of NSL's final investment decision. We have also proposed to set a target of 93% for NSL's availability incentive.

About this consultation

This consultation will run for four weeks. Subject to stakeholder responses, we will aim to make our final decision in late 2016. We will then modify NSL's interconnector licence to give effect to our decision.

³ We use a placeholder value at this stage to ensure that the provisional cap and floor levels are set based on a reasonable likely view of total costs.



Final Project Assessment of the NSL interconnector to Norway

After construction we will finalise our cost assessment at the PCR stage, to take into account efficient expenditure needed to address eligible risk-related cost variance and also to assess the project's operational and maintenance costs.

1. Background

Project overview

1.1. The NSL project is a 1.4GW HVDC electricity interconnector between Blyth, Northumberland in England and Kviildal in Norway. It was previously known as NSN ('North Sea Network') but changed its name to NSL ('North Sea Link') in late 2015. Our previous decisions in relation to the NSN project apply to the NSL project. NSL is shown alongside other approved interconnector projects in Figure 1 below.

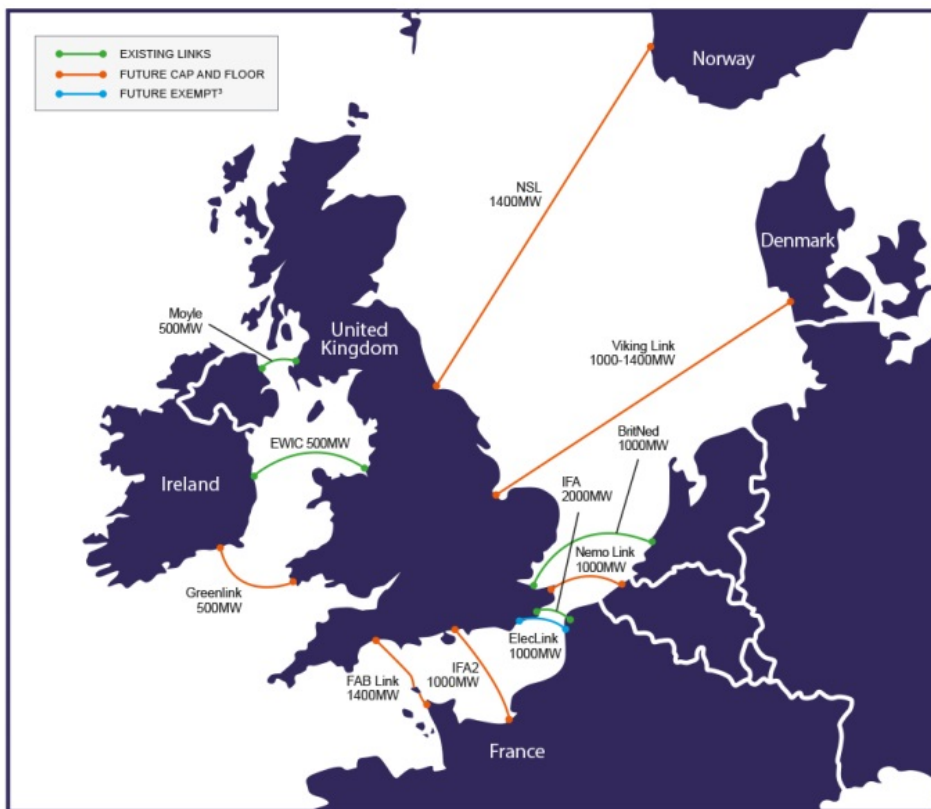


Figure 1: Map of existing and approved GB electricity interconnectors

1.2. The NSL project is being jointly developed by NGIH, as a subsidiary of National Grid plc and Statnett, the Norwegian transmission system operator (TSO).

Our cap and floor regime applies to National Grid's 50% share in the NSL project.⁴ Statnett's share in the project is regulated by the Norwegian regulator, NVE.

Our cap and floor regime

1.3. The cap and floor regime is the regulated route for interconnector development in GB. We developed the cap and floor regulatory model jointly with the Belgian regulator, CREG, for application to the Nemo Link interconnector. We then extended the cap and floor regime to other interconnectors in August 2014.⁵

1.4. There are two main stages to our cap and floor regime – the Initial and Final Project Assessments (IPA and FPA). At the FPA stage we confirm the grant of a cap and floor regime and set the provisional cap and floor levels. These levels are then confirmed at the post-construction review (PCR) stage of our assessment framework. This is set out in Figure 2 below.

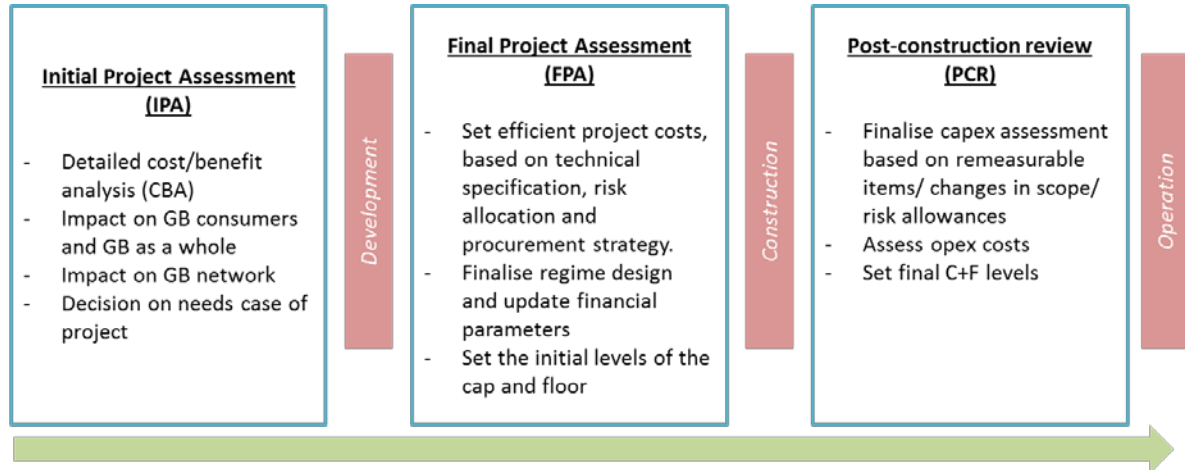


Figure 2: Cap and floor assessment framework

1.5. We assessed the needs case for the NSL project at the IPA stage and decided in March 2015 to grant the project a cap and floor regime in principle. This was based on our assessment that the project is likely to significantly benefit GB consumers and GB as a whole. This decision was subject to the costs of the project not materially increasing.

⁴ National Grid North Sea Link Ltd (NGNSL) is the licenced entity on the GB side of the interconnector. This licensee is a wholly owned subsidiary of National Grid plc.

⁵ We extended the cap and floor regime to near-term projects in August 2014, and then confirmed this as our enduring approach to interconnector regulation in March 2015 as part of our Integrated Transmission Planning and Regulation project conclusions.

1.6. We also made a decision on aspects of the FPA for NSL in March 2015, which are therefore not considered in this document. The section below discusses what is within the scope of this consultation.

1.7. The cap and floor regime for NSL is a split-regulation model. This means that the cap and floor applies to NGIH's 50% share of the costs and revenues of the interconnector, whereas Statnett's 50% share is not covered by the cap and floor. This differs from the joint-regulation model adopted for the Nemo interconnector to Belgium, whereby a single cap and floor will be applied to 100% of the asset and jointly regulated by Ofgem and CREG, the Belgian regulator. This difference in approach leads to a few small changes to the application of the default cap and floor regime, such as how tax arrangements are reflected in the setting of the cap and floor. More information on the regime design for NSL is set out in Appendix 2.

Purpose of this document

1.8. This document sets out our minded-to position on the FPA of the NSL interconnector. We aim to provide a clear view on NSL's proposed costs by confirming which costs we see as firm, and which we view as uncertain, and then to assess whether the firm costs have been efficiently incurred. We will then update the cap and floor levels according to our assessment of costs. This follows the guidance on our FPA stage, as set out in our August 2014 cap and floor rollout decision.

1.9. The following areas are in the scope of this document:

- Costs (incurred and expected) in relation to the cable and converter stations based on the project's Engineering, Procurement and Construction (EPC) contracts.
- Other capital expenditure (capex) incurred in the construction phase, including the profile of this capex over the period of construction.⁶
- Non-capex expenditure such as project management costs.
- Treatment of risk and foreign exchange hedging.
- Finalising the target for the availability incentive which will apply to the project.
- Confirming the regime design for the project, taking into account any deviations from the default cap and floor regime where relevant.⁷

⁶ Certain possible adjustments to EPC contract values will be made at PCR stage. More information on our approach to these cost variations is set out in Chapter 3.

1.10. The following areas were decided in March 2015 and are hence not in the scope of this document:

- development costs
- technology choice
- route.

1.11. The following areas are to be decided at the PCR stage and are also not in the scope of this document:

- operational costs (opex)
- adjustments to EPC contract values and non-contract costs as a result of specific risk and remeasurable items.

1.12. The provisional cap and floor levels presented in this document will include some items (such as risks and opex) which we haven't yet assessed. These will be included as placeholders in order to give a reasonable projection of the cap and floor levels at this stage. These placeholder values are based on our initial view of NGIH's costs. However, as noted above, these items will only be assessed at PCR stage and so the final cap and floor levels for the project may be subject to some adjustment up or down.

1.13. The scope of the PCR is set out in more detail in Chapter 3.

Next steps

1.14. This consultation will run for four weeks. Following this, we will look to review stakeholder responses and make our final decision in late 2016. We will then introduce changes to NSL's interconnector licence to give effect to our decision, following our statutory licence modification process.⁸

⁷ The default cap and floor regime design for Window 1 interconnector projects is set out in our May 2014 cap and floor consultation and our subsequent August 2014 decision.

⁸ Depending on the extent of licence changes required to give effect to our decision, we may publish an informal consultation prior to the statutory 28-day licence modification consultation. We have recently followed a similar process for the Nemo interconnector:

<https://www.ofgem.gov.uk/publications-and-updates/statutory-consultation-changes-standard-conditions-electricity-interconnector-licence-electricity-interconnector-licences-held-nemo-link-and-NGIH-and-electricity-transmission-licence-held-nget>



1.15. More information on the next steps following the conclusion of our FPA stage is included in Chapter 5.

2. Cost assessment

Chapter Summary

This chapter gives our view on NSL's proposed costs for the link, including an explanation where we are suggesting disallowing certain costs. The final cost figures presented in this chapter have been used to set the provisional cap and floor levels.

Question box

Question 1: Do you agree with our benchmarking of the NSL project?

Question 2: Do you agree with our views on NSL's level of project management?

Question 3: Do you agree with our views on and proposed approach to project risks?

Background

Our assessment of NSL to date

2.1. We took a decision on some elements of NSL's FPA in March 2015. These items have not been subsequently reviewed during our FPA assessment and will not be revisited as part of this consultation. These include development costs up to contract award and the technical scope (ie the route, cable and converter types), capacity and landing locations. At that stage, we concluded the following aspects were appropriate based on the information provided:

- the proposed route
- mass impregnated cable type
- voltage source converter (VSC) technology
- cable voltage (+/- 525kV)
- cable and converter capacity of 1400MW
- landing points at Blythe and Kvilldal
- development costs of £12.2m (in 2013/14 prices), equivalent to £12.6m in 2015/16 prices.

Scope of this cost assessment

2.2. The scope of this FPA stage is to assess the construction costs of the project, within the parameters of the above mentioned March 2015 decision. This means determining the economic and efficient costs for the capital spend (which has mostly been contracted out), the developer's project management, and some other smaller items (eg some site preparation work and the hedging costs for the contracts).

2.3. We assess the capital costs and shared costs of the project as a whole, to ensure that spending is efficient. We then use the NGIH share of this spend to inform the cap and floor levels for the GB 50% share of the project.⁹

2.4. These costs will determine the provisional cap and floor levels. A final review is then conducted at the post-construction review (PCR) stage, once most (c.90-95%) of the construction costs have been committed or commercial operations have started (the earlier of the two).

Our cost assessment approach

2.5. To assess this project we hired a consultant consortium of Atkins, HVDC Tech, CEPA and Powersure to provide an independent view of NSL's costs and approach to the project. The consultants' views have informed (but not determined) our position.

2.6. The following summarises the consultants' views against their scope of work:

- The procurement process followed by NSL for its main contracts was generally efficient and the selection process was likely to have led to competitive bids.
- The main assets are reasonably priced and fit within the expected range of benchmarks.
- Risk allocation was mostly standard for the contract type (FIDIC Silver Book) but questions remain around the rationale for contract variations that had been made to this template. For example, NSL's decision to remove the role of the Dispute Adjudication Board, which is used to facilitate the resolution of disputes, and instead rely in last resort on a judicial route.
- Developer's estimates of the costs for work it will itself conduct (eg project management). Our consultants view these estimates as

⁹ The costs that inform our cap and floor levels are: 100% of NGIH's development costs; 0% of Statnett's development costs; 50% of the total costs of cable, converters, site preparation (in both Blyth and Kvilldal) and trading systems; 100% of GB-specific separate costs; and 0% of Norway-specific separate costs.

reasonable, if not slightly low, for this type of project. We consider NSL's estimates to be well informed by the contract negotiations and known risk allocation.

2.7. A final report provided by the consultants is available alongside this consultation.

Our view on NSL's submitted costs

2.8. NSL submitted its incurred and forecast costs to Ofgem at the end of December 2015. We have assessed these costs and engaged with the project developers to ensure we understand the detail of its scheduled activities. Our analysis is presented in two sections below; the project's (a) firm costs, and (b) uncertain costs.

Assessment of firm costs

2.9. The cable was tendered by NSL in three lots to allow multiple bids and to mitigate concerns about a restricted supply market and manufacturing constraints. NSL nominated Nexans to supply and install the Norwegian subsea and underground section, whilst Prysmian will supply and install the middle and GB sections of subsea and underground cable. Both contractors won their bids on the grounds of experience and risk-adjusted price.

2.10. The HVDC converters are being supplied by ABB on both the GB and Norwegian sides. ABB won the tender on technical grounds and on price.

2.11. These contractors are responsible for almost all of the project's construction work, in the form of engineering, procurement and construction (EPC) contracts.

2.12. Both Ofgem and our technical advisors have benchmarked the cable and converter costs against similar projects.¹⁰ Cable costs appear reasonable, particularly the contract prices alone. The converters costs appear high compared to the limited number of suitable benchmarks that we have available; our consultants, however, have advised that this premium is reasonable given the new technology being employed and the associated risks (ie high capacity and voltage). Consequently, we would expect that subsequent projects may be capable of achieving lower costs in the future.

¹⁰ We have benchmarked the cable and converter cost against publicly available information relating to comparable projects – those which are large, high-value, HVDC links. These benchmarks are top-down project costs without detailed disaggregated information. We have therefore not used these benchmarks in our further assessment of uncertain or risk-related costs.

2.13. The developer itself also has costs associated with these contractual components, such as project management and insurance. Our consultants have advised that these costs appear reasonable for a project of this size. Our only proposed non-contract disallowance is for commissioning power (£0.63m), which we have not agreed with in principle.

Assessment of uncertain costs and setting the scope of the PCR

2.14. The NSL project has a number of specific areas of cost uncertainty, described below in three categories:

- provisional sums
- variation orders, options and additional provisions
- risk-related expenditure.

2.15. The costs associated with these three areas are uncertain at this stage, but will become clear – and may result in higher or lower costs – by the time of the PCR.

Provisional sums

2.16. These relate to work where NSL is certain to incur cost, but the final sum is not locked down in the contracts. For example, the cable will require protection sleeves, but the precise quantity will depend on a number of factors that arise in the course of construction. For these situations, in its contracts NSL has agreed the price per unit of the work, and included its best estimate of the volumes required – but the outturn volume might change. These ‘provisional sums’ relate to the cable contracts, and total [REDACTED] (NGIH’s half).

2.17. We have not conducted a detailed analysis of the proposed unit costs. However, the overall contract costs look reasonable, and we thus conclude the unit prices and estimated volumes are reasonable.¹¹ Our consultants consider that NSL (or its contractors) may not yet have completed all surveys that will ultimately be needed. However, they are concerned with the scale of provisional sums this has resulted in, and the associated uncertainty in final outturn costs.

2.18. Our view is that the scale of these values, and their influence on our current view of the total project costs, makes it necessary to take a view on these values at the FPA stage rather than postpone until the PCR. On the basis of the information

¹¹ NSL’s provisional sums were included in our benchmarking analysis only to the extent that they inform the total expected cost of converters and cables. Comparable project benchmarks are not granular; we expect the price and volume for individual scope of works to vary considerably between projects, and currently think it is more appropriate to assess total project costs.

provided to us, and the surveys conducted to date, we think the current provisional sum estimates are reasonable. This will mean most variations in these sums will be at NSL's risk, and will generally not be eligible for review at the PCR stage.

2.19. We have also considered an alternative approach – to review the provisional sums, and any changes to their volumes, at the PCR stage. However, given their potential impact on the total project cost, we consider it is more appropriate to assess them at this stage alongside the firm contractual costs. This is partly because we have benchmarked NSL against similar projects at the total asset level. Repeating or postponing this exercise until the PCR does not align with our policy intent but we welcome views on this issue.

2.20. We propose fixing the provisional sum costs that feed into the cap and floor at this stage. In other words, any changes in these costs at the later PCR stage as a result of different outturn volumes would not be eligible to feed into the cap and floor unless they qualify as risk-related items (which are discussed further below). The core elements of the provisional sums are considered fixed at this stage (as shown in Table 1 below).

Variation orders, options and additional provisions

2.21. These are costs that are not part of the base contract, and may have been agreed after the main contracts have been signed (particularly variation orders). For example, the need for additional crossings since signing the contract has also meant more rock placement. Preparatory work, such as surveys, will play a significant role in these variations over the construction period.

2.22. We propose assessing variation orders, options and any additional provisions ex-post at the PCR, at the same time as reviewing the quality of their preparatory work (amongst other things). We would need to ensure that any variation orders have been efficiently incurred. These items currently amount to £34m (NGIH's half) of the submitted costs, though this may rise as construction progresses.

Risk-related expenditure

2.23. NSL is forecasting to incur £232m of costs from a wide range of additional risks materialising (of which NG's share is £116m).¹² This includes estimated costs to manage issues such as delays due to extreme weather conditions, logistical delays and project management failures. The actual outturn costs, however, may be quite different.

2.24. Risk should sit with those best placed to manage them. Our approach to the risks submitted by NSL is twofold:

¹² The risks contained in this section are outside the current scope of the project's contracts.

- We will set out 'eligibility' principles for risk elements that we consider could be shared between NSL and consumers (as set out in Chapter 3), and therefore which costs could be included in the cap and floor calculation; and
- We cannot reliably quantify the materiality for eligible risks ex-ante at the FPA stage. Therefore, we will review their actual impact on the cap and floor on an ex-post basis, as part of the PCR. The cap and floor should not reflect risks that are not efficient. Therefore, for risks where consumers could provide some underwriting, the developer should have appropriate mitigating solutions in place so that consumer exposure is minimised.

2.25. We have assessed the full list of risks provided by NSL at this FPA stage. If these materialise and lead to additional delivery costs, we think that the majority of these should not be included in the cap and floor levels. For example, we have rejected risks relating to the performance of contractors and the developer, interface between the project parties, and supply chain issues (eg including EPC contractor default). As a result, we have considerably reduced the number of risks consumers are exposed to relative to the developer's submission. The remaining risks are primarily low probability, high-impact issues.

2.26. Given that we are not in a position to robustly quantify the value of these risks ex-ante at the FPA stage, we make no judgment at this stage about any possible adjustment to the final cap and floor levels caused by cost variations arising from these risks. With the FPA setting the provisional cap and floor levels, we have used half of NGIH's estimated risk pot (ie £58m) as a placeholder figure which will later be replaced by the figure determined following our assessment at the PCR.¹³ We underline that this placeholder gives no indication about our views on the likely levels (if any) of allowable risk-related cost variance, and hence of any variations to the final cap and floor levels (which may increase or decrease). Further information on how we will treat these risk-related costs at the PCR is set out in Chapter 3.

Summary of our cost assessment

2.27. Table 1 below summarises our current view on the efficient costs for the NSL project. Rows coloured green represent costs that we propose to fix at the FPA stage. Yellow rows represent costs that will be revisited as necessary at the PCR stage (in line with our guidance on the PCR as set out in Chapter 3 below).

¹³ NGIH will share the cost of risk-related expenditure equally with Statnett. At present, we have used half of NGIH's projected exposure, which therefore represents a quarter of the current projections for the full project.

All values in £m 2015-16

		Submitted costs at IPA	Submitted costs at FPA	Our current view of allowance at FPA
NSL (developer) costs	Risk / contingency	84	116	58 ¹
	Project management	59	42	42
	Other costs		31	30
Contracts	Firm prices + provisional sums	757	474	474
	Variation orders, options and additional provisions		34	0
Total (£m)		900	697	604

¹ We have used a 'placeholder' of £58m for risk and contingency. The outturn value is assessed and set at PCR.

Table 1: Our view on the efficient project costs at the FPA stage

2.28. The above costs will form the basis of the provisional cap and floor levels. Based on these costs, the cap on revenues that NSL can earn will be £94.2m a year. The floor will be £53m a year.¹⁴ This represents a reduction of roughly 30% compared to our expectation of £140m (cap) and £75m (floor) at the IPA stage. Further information on how the cap and floor levels have been calculated is provided in Chapters 4 and 5 and Appendix 2.

2.29. We seek stakeholder views on our cost assessment, above, and on the cap and floor levels for the project.

¹⁴ These cap and floor levels are only applicable to the 50% National Grid share in the NSL project. The 50% Statnett share of the project will be regulated independently by NVE.

3. Expectations for the post-construction review

Chapter Summary

This chapter gives our view on how we expect to approach the post-construction review (PCR), explaining the nature of cost variations that might be allowed into the final cap and floor levels.

Question box

Question 4: Do you agree with our proposed approach to the post-construction review?

Question 5: Do you have any other views on the post-construction review for NSL?

Scope of the post-construction review

3.1. The FPA determines our current view of the economic and efficient costs to feed into the cap and floor levels. For many reasons the outturn costs may be different. The PCR will adjust the FPA's provisional cap and floor levels for costs we deem to be eligible and efficient. The eligible items are:

- Operational costs: We are using the cost estimates provided by NSL at this stage, as we did at the IPA stage, as a placeholder until the PCR. At the PCR stage we expect to conduct a full assessment of the efficient costs of operating the NSL interconnector.
- Risk and uncertain contracted items: The following sections will detail which of these items are eligible for assessment at the PCR.
- Insurance: We have used NSL's submitted numbers for the construction insurance. Variations to this will be subject to the same eligibility criteria as other variations in cost.

3.2. At this stage we have approved the profile of capex spend over the period of construction and an expectation of IDC earned has been included in the cap and floor levels. If this IDC accrual changes significantly due to a movement in spend profile then we will consider this at the PCR stage alongside our assessment of the efficiency of eligible additional costs.

Treatment of variations in construction costs

3.3. Following the FPA, NSL will be required to submit annual returns during the construction phase, including cost variations from the expectations set at the FPA.

NSL, as all interconnectors, will submit detailed financial information and explanations annually.

3.4. NSL will need to maintain high quality financial records according to requirements set out by Ofgem to provide evidence of its expenditure during construction. Part of this information will be submitted as part of the routine annual reporting (the Regulatory Instructions and Guidance, or 'RIGs'). As a minimum NSL will need to:

- Ensure a clear paper trail of expenditure for all items submitted as part of the FPA. For example, expenditure on each contract will need a clear distinction between spend on the original contract price and any variations to it. If Ofgem is unable to distinguish the expenditure, it may assume it is expenditure for the items already assessed at the FPA and therefore not eligible for further allowances.
- Evidence will need to be provided for all expenditure such that a forensic audit can be carried out by Ofgem if required. Items which cannot be evidenced (eg no invoice and proof of payment) may be disallowed by Ofgem entirely.

3.5. All changes in cost (including risk-related costs and variation orders) will need to be transparently differentiated against the scope of works and expectations at the FPA so that they can be assessed separately from FPA items. They will need to be evidenced and reported in the reporting year in which they occurred, in addition to being part of the PCR submission.

PCR eligibility principles for variance in construction costs

3.6. Any variation in cost or scope, where the developer believes this should be included in the cap and floor, will need to be reviewed at the PCR. However, we expect any cost variation to be subject to two tests at the PCR before allowances can be varied: eligibility and efficiency. Items that are deemed eligible will be reviewed for their economic efficiency before varying the cap and floor levels.

3.7. The eligibility principles will help determine the size of risk-related cost variance that should adjust the provisional cap and floor levels at the PCR. Any risk-related cost variance that is not considered eligible will not adjust the cap and floor level and will be borne by the developer alone.

3.8. Where the cap and floor levels are adjusted, the developers may earn interest during construction (IDC) on eligible additional costs. We will only grant IDC and additional costs associated with delays if developers can demonstrate it was outside of their control and the costs were efficiently incurred.

3.9. As set out in the previous chapter, the FPA determines an allowance for all costs that are, or should be, well-justified at this stage. The PCR will review costs which:

- Could not have been reasonably foreseen at the FPA stage; **and**
- Have arisen due to an unrelated third party or external event (ie out of NSL's control).

3.10. Both of these conditions must be met. For example, if weather (an external event) is poor and negatively impacts the project's costs, these are likely to be ineligible if this weather could have been foreseen using normal and reasonable bounds for seasonal or monthly weather patterns and mitigating actions could have been taken.¹⁵

3.11. When we apply these principles to the risk items NSL is currently foreseeing, it becomes clear that the majority of NSL's risk items are not within the scope for the PCR. As examples from NSL's FPA submission, these include:

- Performance of the project organisation, including risks around 'inadequate/non-functional decision making during marine operations', 'delay in actioning consents', and 'insufficient interface coordination between sub projects'.
- Interface risks between contractors and the developer, including between cable, converter and tunnel contractors at the termination site where poor coordination could lead to additional work and cost.
- Contractor capability and expertise risks, which are entirely within the developers control through its nomination process for each contractor and its own contractor management. For example, 'machinery or equipment failure in factory', 'poor manufacturing quality' (leading to commissioning failure), 'reduced manufacturing capacity' (meaning the schedule cannot be met), and 'breakdown of cable laying vessel' are all clear failures on the contractor's part. These are all foreseeable risks and could be mitigated prior to the FPA through due diligence and contract terms throughout the procurement process.

3.12. Conversely, following the eligibility principles in paragraph 3.9 above, we would consider some other cost variance as eligible, such as the following:

- An unpredictable and impossible to mitigate change in the consent terms after NSL had already been granted them which could not have been reasonably anticipated at the FPA. Only if these qualifiers were met would we consider NSL's risk item 'MMO [Marine Management Organisation] assessments results in increased burial depth' as eligible.

¹⁵ We do not attempt to quantify the statistical bounds of 'normal' or 'reasonable' at this stage. The onus will be on NSL to provide evidence at the PCR stage that any such events could not have been reasonably planned for or foreseen.

- Ground conditions during construction being very different from those expected at the FPA and informed by the prior surveys. The caveats to this are that the surveys that informed the FPA costs must have been fit for purpose and reasonable (ie within the standard of what an efficient developer could reasonably be expected to have done). We would not accept minor variations in the ground conditions (ie within the statistical norms for variability given by the survey data). Cost variance would need to be justified on the basis that conditions were very different from those expected and ground conditions could not reasonably have been better determined at the time. Again, if we judged that these qualifiers were met, we would consider NSL's risk item 'Converter - Findings in the ground (Event) - Risk of UXO or archaeological findings in the ground' as eligible.
- Extreme weather is another eligible case for the PCR that follows from the above principles. In any assessment at the PCR we would need to take a view on whether the contractors' operating parameters were reasonable and well justified (ie we would define what qualifies as eligible cost variance from reasonable operating limits), and whether the original construction schedule was efficient. Again, if we judged that these qualifiers were met, we would consider NSL's risk item 'Extreme weather, flooding, heavy snow fall' as eligible.

3.13. Not all variances may be higher costs. For example, on the above terms, we may find that weather conditions were better than expected (leading to lower cost) and ground conditions worse than expected. We would consider all of the risk eligible items together to determine any variations to the cap and floor levels at the PCR.

Timing of the PCR

3.14. We intend to start the PCR process at the earlier of:

- 90-95% spend committed; or
- Start of the commercial operations date.

3.15. We think the above criteria are reasonable on the basis that at the time when 90-95% of spend is committed or the commercial operations have started, it is reasonable to expect that majority of works will be completed. To the extent that NSL might have reasonable grounds to believe that some of the remaining construction works might be exposed to certain risks after this point, we intend to provide them with an ex-ante allowance for managing these risks, which would be granted as part of the PCR and would not be reopened. If some risks materialise shortly after PCR submission by NSL, we might allow inclusion of these costs into the PCR up to a certain cut off point. This cut off point will be specified as part of the PCR guidance to ensure that there is no unreasonable delay to the PCR process.

3.16. If the PCR process doesn't conclude within the first year of operation, we reserve the right to disallow NSL any within-period revenue assessments until the PCR is completed and final cap and floor values are established.

Summary

3.17. In summary, NSL will need to evidence spend against items submitted at the FPA, record and justify any variance from it, and submit this information annually during the construction phase and for the PCR. We will review this information and assess any risk-related cost variance for eligibility at the PCR.

3.18. To be eligible for further allowances, risk-related cost variance will need to have been driven by factors beyond NSL's control (eg third party impacts) and could not have been reasonably foreseen at the FPA (eg exceptional ground conditions unforeseeable by reasonable surveys).

3.19. If any risk-related cost variance is deemed eligible, only efficient costs will then be allowed. We expect NSL's decisions taken in response to such risk-related factors to be evidence-based and the developer to be responsible for proving that decisions taken in response to such variations were efficient.

4. Other aspects of our Final Project Assessment

Chapter Summary

This chapter details our minded-to approach to updating the cap and floor financial model for NSL, and to setting the provisional cap and floor levels. We are also seeking views on the proposed target for the availability incentive for NSL.

Question box

Question 6: Do you agree with our proposal to set an availability target of 93.0% for the NSL interconnector based on the updated report by GHD consultants?

Question 7: Do you have any views on the updated regime design, financial parameters or cap and floor financial model?

Cap and floor financial model

- 4.1. The cap and floor values are calculated using our cap and floor financial model. Broadly, the cost allowances are fed into the model as building blocks, with benchmark financial measures applied to give the values of the cap and the floor, which are calculated independently of each other.
- 4.2. Our updated cap and floor financial model for NSL is published as a subsidiary document to this consultation. We have updated it to include the relevant project-specific parameters.
- 4.3. Amongst other things, this reflects the financial indices that set the cap and floor – the cost of equity (cap) and debt (floor) benchmarks. These have been set based on the date of NSL’s final investment decision (FID) which was taken in March 2015. We provide the full list of these financial parameters in Appendix 2.
- 4.4. As noted in Chapter 2, we have used a placeholder value for the potential cost of unexpected events and mitigating actions. We have tightly defined the conditions that any such events must meet in order to limit the scope of the PCR.
- 4.5. The cap and floor financial model also includes values for other aspects that we will assess at the PCR stage, such as insurance and operational costs. At this stage we have used the developers’ cost estimates to inform the cap and floor levels.

Availability incentive

- 4.6. The availability incentive is a mechanistic incentive which applies to all cap and floor interconnector projects. The incentive aims to ensure that the developers maintain technical availability of the cable, even in periods when they could

reasonably expect revenues to exceed the cap or fall below the floor. We think that incentivising good technical availability will help to ensure that consumers realise the full benefits of interconnection between GB and Norway.

4.7. Our availability incentive has been informed by previous work undertaken by Sinclair Knight Merz (SKM) consultants. We published an overview study and report as part of our March 2013 consultation on the Nemo interconnector¹⁶ and set out our intention to apply the same incentive to other cap and floor projects in our May 2014 cap and floor regime consultation and our subsequent August 2014 decision.¹⁷

4.8. The availability incentive gives a potential 2% upside and downside to maximum interconnector revenues at the cap. This is based on performance against a target level of availability. If developers outperform against the target by up to two percentage points, then the cap level increases by the same amount. If developers underperform against the target by up to two percentage points, then the cap level reduces by the equivalent. The specific availability target varies from project to project, depending on a number of technical factors such as project design and cable length.

4.9. At 714km, NSL is the longest of the current pipeline of interconnector projects and will be bipole, rather than monopole. We asked GHD consultants to update the technical input assumptions to reflect the final design of the NSL interconnector.

4.10. We also asked GHD to update the assumptions and data sets behind our availability incentive model, to ensure that it continues to be fit for purpose. They have updated the previous model to:

- Consider updated data assumptions for converter unavailability, transformer failure rates and circuit breaker failure rates;
- Capture the impact of improved subsea cable burial techniques; and
- Provide a more accurate view on maintenance-related unavailability.

4.11. More information is provided in GHD's summary report, which is published alongside this consultation. An updated availability model is also published alongside this consultation. The updated model can be edited by interconnector developers to capture project-specific information.

¹⁶ The 2013 SKM report is available here:

https://www.ofgem.gov.uk/sites/default/files/docs/2013/03/skm-report---calculating-target-availability-figures-for-hvdc-interconnectors_0.pdf

¹⁷ Our May 2014 proposal to roll out our cap and floor regime is available here:

<https://www.ofgem.gov.uk/publications-and-updates/regulation-future-electricity-interconnection-proposal-roll-out-cap-and-floor-regime-near-term-projects>

4.12. Using the updated model and reflecting NSL's design specifics, GHD propose a base case availability incentive target of 92.86%. **We propose applying a target of 93.0% to the project.**

4.13. We seek views on using this target of 93.0% as the availability target for NSL's cap and floor regime.

Other regime design considerations

4.14. The default cap and floor regime was set out in our May 2014 consultation document and our December 2014 decision on the Nemo interconnector to Belgium. This regime is intended to be implemented for the Nemo project through licence changes. We consulted informally in February 2016 and published a statutory consultation on these changes in August 2016.¹⁸

4.15. NGIH has not requested any specific or significant variations from the default regime. However, there are a number of areas where we have updated our regime design to account for the project being split, rather than joint, regulation between the two countries. These changes are captured in Appendix 2, which provides a summary of the regime design that will apply.

¹⁸ Our August 2016 statutory consultation on the licence changes required to give effect to the cap and floor regime for the Nemo interconnector is available here: <https://www.ofgem.gov.uk/publications-and-updates/statutory-consultation-changes-standard-conditions-electricity-interconnector-licence-electricity-interconnector-licences-held-nemo-link-and-ngih-and-electricity-transmission-licence-held-nget>

5. Conclusions and next steps

Conclusions of our FPA of the NSL interconnector

5.1. In this consultation we have assessed the firm costs submitted by NGIH as project developer. We have also assessed NSL's approach to uncertainty and risk (including risk-related cost variance) and have set out our principles for our assessment of any additional risk-related spend at the PCR stage.

5.2. Based on our cost assessment we think a total capex figure of £604m represents reasonable expenditure for the NSL interconnector at this stage. Of this figure, £58m is a placeholder which will only be assessed at the PCR. The total figure of £604m is a reduction of approximately 13% on the developer's FPA submission of £697m, and 33% on the IPA submission of £900m.

5.3. We have also provided more detail on our update of the cap and floor financial model for NSL, which has been used to set the provisional cap and floor levels detailed below.

5.4. We have proposed an availability target of 93.0% for NSL as part of our availability incentive. The cap level can increase or decrease by up to 2% based on outperformance or underperformance against this target.

5.5. We seek stakeholder views on our FPA of the NSL interconnector, and in particular on our minded-to positions noted above.

Provisional cap and floor levels

5.6. We have updated the project's cap and floor levels to reflect the outcome of our cost assessment and the updating of relevant financial parameters for the project.

5.7. We propose setting a provisional cap level of £94.2m and floor level of £53m.

5.8. These cap and floor levels are lower than those used at our IPA stage. We think the project can therefore be reasonably expected to provide greater benefits to consumers than expected, as (all else being equal) the current cap and floor levels would reduce the likelihood of floor payments and increase the likelihood of cap payments.

5.9. These cap and floor levels are not final. They will only be finalised following our PCR assessment, on which we will consult. The final cap and floor levels will include our assessment of operational costs and our final view on additional spend in relation to certain risks (and hence the placeholder numbers used at this stage to inform the indicative cap and floor levels), following our approach set out in Chapters 3 and 4.

5.10. Following the PCR, the cap and floor levels will then be confirmed and set for the duration of the regime, subject to limited opex re-openers.

Next steps

5.11. We are consulting on our minded-to positions, including the provisional cap and floor levels, for four weeks. We invite responses to this consultation by **15 November 2016**. Responses should be sent to Cap.Floor@ofgem.gov.uk. Appendix 1 contains more information on responses to this consultation.

5.12. Following this consultation, we will consider stakeholder responses and look to make our final decision in late 2016. We will consult on proposed changes to NSL's interconnector licence to give effect to our decision, following our statutory licence modification process.

5.13. NSL will need to report to us throughout the construction period. Alongside our licence consultation we will publish regulatory instructions and guidance (interconnector RIGs) which will set out these reporting requirements in more detail.

5.14. As part of this reporting, NSL should provide notice of any significant variations from the project delivery schedule, including in response to unexpected events that have a significant impact on project costs. Where expenditure relating to such risks is deemed to be eligible, we will review this information at the PCR stage.

5.15. NSL will need to apply for certification under European and national unbundling legislation prior to operation of the interconnector.

5.16. For the PCR stage assessment, NSL will need to submit information at the earlier of 90-95% of capital costs being committed or start of full commercial operations. The scope of the PCR is limited and only items noted in Chapter 3 will be (re)assessed. The result of the PCR will be an update to the cap and floor levels in NSL's interconnector licence, which will represent the final cap and floor values for the 25-year duration of the cap and floor regime (subject to a discretionary operational cost reopener).

Appendices

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Appendix 1 – Consultation response and questions

We would like to hear the views of interested parties in relation to any of the issues set out in this document. We would especially welcome responses to the specific questions which we have set out at the beginning of each chapter heading and which are replicated below.

Responses should be received by **15 November 2016** and should be sent to:

Stuart Borland
Competitive Networks
Ofgem
9 Millbank
London.
SW1P 3GE.

Unless marked confidential, all responses will be published by placing them in our library and on our website www.ofgem.gov.uk. Respondents may request that their response is kept confidential. We shall respect this request, subject to any obligations to disclose information, for example, under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004.

Respondents who wish to have their responses remain confidential should clearly mark the document(s) to that effect and include the reasons for confidentiality. It would be helpful if responses could be submitted both electronically and in writing. Respondents are asked to put any confidential material in the appendices to their responses.

Next steps

Having considered the responses to this consultation, we intend to take a final decision on the FPA of the NSL interconnector and to set the provisional cap and floor levels for the project. Any questions on this document should, in the first instance, be directed to:

Stuart Borland
Competitive Networks
0207 901 7134
Cap.Floor@ofgem.gov.uk

Chapter Two

Question 1: Do you agree with our benchmarking of the NSL project?

Question 2: Do you agree with our views on NSL's level of project management?

Question 3: Do you agree with our views on and proposed approach to project risks?

Chapter Three

Question 4: Do you agree with our proposed approach to the post-construction review?

Question 5: Do you have any other views on the post-construction review for NSL?

Chapter Four

Question 6: Do you agree with our proposal to set an availability target of 93.0% for the NSL interconnector based on the updated report by GHD consultants?

Question 7: Do you have any views on the updated regime design, financial parameters or cap and floor financial model?

Appendix 2 – Regime summary for NSL

In this appendix we provide a summary of the key cap and floor regime features as well as financial parameters that will apply to NSL project.

We have not received any formal request for regime variations and so our default regime, as set out in May and August 2014 policy documents, applies to the NSL project.

The final regime design will be confirmed via changes to the NSL interconnector licence, following a statutory consultation process.

Table 1: Key regime features

<p>Regime duration and start date</p>	<ul style="list-style-type: none"> • The regime duration is 25 years. • The regime start date for NSL will be the earlier of the following: <ul style="list-style-type: none"> ◦ the actual commissioning date ◦ 1 Jan 2021. • The cap level will come into effect automatically on the regime start date. • The floor level will come into effect following a successful completion of a proving period and will be retrospectively applied from the date when the successful proving period started. • Even where delays are outside the control of the developer, we will start the 25-year cap and floor period from the earlier of the actual commissioning date or 1 January 2021. This means that if delays push the operational date beyond the end of 2020, the length of the regime would be reduced by the length of the delay. • We will grant interest during construction (IDC) and additional incurred costs associated with delays if developers can demonstrate they were outside of their control and were efficiently incurred. Our final view on the application of IDC to the project's spend will be confirmed at the PCR stage.
<p>Amount of project covered by the regime</p>	<ul style="list-style-type: none"> • The GB cap and floor regime will cover 50% of the project (meaning 50% of total project costs and 50% of total project revenues).
<p>Interconnector revenues</p>	<ul style="list-style-type: none"> • All sources of interconnector revenue, including from selling capacity, capacity market payments and provision of ancillary services will be taken into account for assessment against the cap and floor levels. • Receipts that substitute revenue will also be included, for example:

	<ul style="list-style-type: none"> ○ business interruption insurance ○ constraint payments. • Certain 'market related costs', defined as firmness, error accounting costs and trip contract costs, will be netted off revenues before comparison against the cap and floor levels (which gives the 'assessed revenue').
<p>Assessment period (assessing whether interconnector revenues are above the cap or below the floor)</p>	<ul style="list-style-type: none"> • Each assessment period is five years. This means that the interconnector's 'assessed revenue' will be compared to the cap and floor levels on a net present value (NPV) neutral basis, every five years. • Each five-year assessment period shall be considered in isolation, with no carry overs between assessment periods. • Where the interconnector's revenue is below the floor or above the cap (on a cumulative basis) during an assessment period, the developer may request a 'within-period adjustment' on the grounds of: <ul style="list-style-type: none"> ○ financeability; or ○ pre-empting a material end of period adjustment. <p>Such a request can cover from year 1 up to year 4 of any five-year assessment period, but must reflect whole years only (not partial years).</p> <p>Ofgem cannot request a within-period adjustment (ie only the developer can trigger a within-period adjustment).</p> <ul style="list-style-type: none"> • Any within period adjustment will be subject to a true-up on a NPV neutral basis at the end of the relevant assessment period. • The discount rate applied for the NPV-neutrality calculations (the operational discount rate) will be the simple arithmetic average of the floor return and the cap return. For NSL this rate is set at 4.55%.
<p>Regulatory reporting</p>	<ul style="list-style-type: none"> • Developers will be required to report annually during the operational phase on revenues, availability and costs. • Developers will also be required to report during construction on construction progress and costs. • This reporting must be in line with the 'regulatory instructions and guidance' (RIGs) issued by Ofgem.
<p>Cap and floor payments</p>	<ul style="list-style-type: none"> • Cap and floor payments will be made between the developer and NGET as the system operator and will be recovered/distributed via the prevailing transmission charging arrangements.

Table 2: Cap and floor levels

<i>Principles for setting the cap and floor levels</i>	
Building blocks approach	<ul style="list-style-type: none"> • The cap and the floor levels are built from building blocks of capital costs, operations and maintenance costs, decommissioning costs, tax and allowed return. • The cost related building blocks (capital costs, operations, maintenance and decommissioning) are confirmed at FPA and/or PCR stages, whereas the financial costs (allowed return and tax) are locked in at FID. • The cap and floor levels will be profiled so that they are flat over time in real terms.
Indexation of the cap and floor levels	<ul style="list-style-type: none"> • Cap and floor levels are indexed by RPI.
Currency	<ul style="list-style-type: none"> • Cap and floor levels are expressed in Pound Sterling.
Availability incentive	<ul style="list-style-type: none"> • The target availability level for NSL is 93%, subject to the outcome of this consultation. • The cap level will be adjusted annually by up to +/- 2% if interconnector availability exceeds or falls short of a target availability level. This means that availability above (or below) the target level will result in a one-for-one percentage increase (or decrease) in the cap level, up to +/- 2%. • Developers will lose automatic eligibility for floor payments for each individual year if availability is below 80% in that year. • Ofgem will retain the discretion to reinstate eligibility for floor payments if the outage that caused availability to fall below 80% was caused by an 'exceptional event' (eg force majeure).
<i>Financial parameters for NSL</i>	
Returns at the floor	<ul style="list-style-type: none"> • The allowed return at the floor, applied to 100% of RAV, is 0.88% (real). • This is calculated using a 20-day trailing average of the GBP Non-Financial iBoxx index of bonds with 10+ years to maturity, with a credit rating of A/BBB. Inflation will be based on 10-year breakeven inflation data published by the Bank of England.
Returns at the cap	<ul style="list-style-type: none"> • The allowed return at the cap is 7.98% (real). <ul style="list-style-type: none"> ◦ This is calculated using capital asset pricing model (CAPM) and comprises the following elements: Equity beta – 1.25 ◦ Risk free rate – 1.6% ◦ Total market returns – 7.10% ◦ UK RPI adjustment – 0.4%
Interest during	<ul style="list-style-type: none"> • The IDC rate for NSL is 6.37% (real).

<p>construction (IDC)</p>	<ul style="list-style-type: none"> • This is calculated in line with our IDC methodology, using CAPM. The value comprises the following elements: <ul style="list-style-type: none"> ○ Cost of debt – 0.88% ○ Equity beta (of a comparator group) – 1.04 ○ Cost of equity – 6.94% ○ Pre-operational gearing – 33.41% ○ Development risk premium – 0.54% ○ Construction risk premium – 0.91%
<p>Tax</p>	<ul style="list-style-type: none"> • Corporation tax rate used for the purposes of calculating cap and floor values is 20%.
<p>Transaction costs</p>	<ul style="list-style-type: none"> • The financial transaction costs (in %) are calculated as a percentage of the opening RAV. The allowances are 2.5% for debt transaction costs and 5% for equity transaction costs. • The final allowance (in £) will reflect the final RAV at the PCR stage.

Appendix 3 – Feedback questionnaire

We consider that consultation is at the heart of good policy development. We are keen to consider any comments or complaints about the manner in which this consultation has been conducted. In any case we would be keen to get your answers to the following questions:

1. Do you have any comments about the overall process adopted for this consultation?
2. Do you have any comments about the overall tone and content of the report?
3. Was the report easy to read and understand? Could it have been better written?
4. To what extent did the report's conclusions provide a balanced view?
5. To what extent did the report make reasoned recommendations for improvement?
6. Please add any further comments.

Please send your comments to:

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