Consultation

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Consultation on Scottish Hydro Electric Transmission's MSIP Re-opener (Skye Dynamic Line Rating Project)

Subject	Details
Publication date:	27 June 2022
Response deadline:	25 July 2022
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We[1] are consulting on the needs case and preferred option for SHET's proposal to install a Dynamic Line Rating system on the 132kV Skye circuit between Edinbane and Broadford. We would like views from people with an interest in electricity transmission and distribution networks. We would also welcome responses from other stakeholders and the public.

This document outlines the scope, purpose and questions of the consultation and how you can get involved. Once the consultation is closed, we will consider all responses. We want to be transparent in our consultations. We will publish the non-confidential responses we receive alongside a decision on next steps on our website at Ofgem.gov.uk/consultations. If you want your response – in whole or in part – to be considered confidential, please tell us in your response and explain why. Please clearly mark the parts of your response that you consider to be confidential, and if possible, put the confidential material in separate appendices to your response.

[1] The terms 'we', 'us', 'our' refer to the Gas and Electricity Markets Authority. Ofgem is the office of the Authority.

Contents

Executive Summary

The RIIO-ET2 price control runs from 1 April 2021 until 31 March 2026. It includes a range of Uncertainty Mechanisms (UMs) that will allow us to assess further funding during RIIO-ET2 as the need, cost or timing of works becomes clearer. This ensures that consumers fund projects only when there is clear evidence of benefit and we have clarity on likely costs. These mechanisms also ensure that the RIIO-ET2 price control has flexibility to adapt as the pathways to Net Zero become clearer.

Where possible, we have set automatic UMs, such as the Generation and Demand Connection Volume Drivers, which provide Electricity Transmission Owner (ETOs) with immediate funding when they are required to undertake new customer connection works. In other areas, where the degree of uncertainty is too great to allow for an automatic mechanism, we set "re-openers" which will allow us to robustly assess ETO proposals once information with sufficient accuracy is made available.

The Medium Sized Investment Projects (MSIP) re-opener provides ETOs with an annual opportunity to request additional funding for sub-£100m projects, many of which may be critical for achieving Net Zero targets. It was developed to ensure that ETOs are able to undertake necessary investments in the transmission network, funding for which has not been provided in RIIO baseline allowances.

An ETO can submit a request for additional funding for activities outlined in Special Condition (SpC) 3.14.6 of its Electricity Transmission Licence[2] via the MSIP re-opener during specific "windows" (each regulatory year between 25 January and 31 January) where it considers a project to be atypical in scope and where the forecast costs are expected to be less than £100m. Projects that meet the criteria will be eligible for consideration and scrutiny by Ofgem, who will assess the needs case and the level of efficient costs.

This document summarises the MSIP submission received from SHET for the installation of a Dynamic Line Rating system on the 132kV Skye circuit between Edinbane and Broadford (henceforth referred to as the Skye DLR project) and sets out our minded-to view not to

[2] Decision on the proposed modifications to the RIIO-2 Transmission, Gas Distribution and Electricity System Operator licence conditions - 1 April 2022 | Ofgem

approve the needs case and preferred option to address that needs case. However, if the these are ultimately approved, Ofgem will undertake an assessment of the efficient costs following SHET's submission of detailed costs in January 2023 in line with the proposed approach presented in chapter 5. Final approval of the project is subject to approval of the efficient costs.

We welcome views from stakeholders on our minded-to views on the project outlined in Chapters 3 to 5.

1. Introduction

What are we consulting on?

1.1. We are consulting on the needs case and optioneering for the installation of a Dynamic Line Rating[3] (DLR) system on the Edinbaine to Broadford section of the Skye 132kV circuit, submitted by SHET under its MSIP re-opener submission in January 2022.

1.2. SHET regards this project as having met criterion 3.14.6(i).ii of its Electricity Transmission Special Licence Conditions[4] as a project 'relating to protection projects that are needed following system studies by the System Operator or the licensee showing a need for dynamic line ratings'.

1.3. This project aims to develop and install a DLR system on the 132kV Skye circuit between Edinbane and Broadford. SHET states that the work being undertaken is to mitigate network constraint ahead of planned reinforcement and provide technical and operational learnings for future DLR projects.

1.4. SHET provided engineering reports and other documentation in support of its submission in January 2022. Since then, SHET has provided additional information through a combination of meetings with Ofgem and responses to our Supplementary Question (SQ).

Consultation approach

1.5. SHET has provided Ofgem with information to justify its proposed option for addressing the needs case for this project as well as the costs associated with its preferred option.

1.6. This consultation sets out our minded-to position on the following areas of the Skye DLR project:

[3] Dynamic Line Rating systems measure high-voltage transmission line capacity in real time, as opposed to relying on more conservative static measurement, with a view to reducing line congestion.
[4] Decision on the proposed modifications to the RIIO-2 Transmission, Gas Distribution and Electricity System Operator licence conditions - 1 April 2022 | Ofgem

- The needs case of the project
- Options to meet the needs case considered by SHET

Context and related publications

1.7. Information on this project can be found in SHET's Skye DLR MSIP Submission.[5] This document is intended to be read alongside:

- SHET Special Licence Conditions 3.14 and 9.4[6]
- RIIO-2 Re-opener Guidance and Application Requirements Document[7]
- RIIO-2 Final Determinations: ET Annex paragraphs 4.49 – 4.58[8]
- RIIO-2 Final Determinations: SHET Annex paragraphs 3.72 – 3.75[9]

1.8. SHET submitted two MSIP re-openers for DLR projects in the January 2022 submission window. It regards the projects as being related. A consultation on the needs case and optioneering for the installation of a DLR system on the 275kV north of Beauly circuit between Beauly and Dounreay, referred to as the Beauly DLR project, has been published alongside this consultation.[10]

Consultation stages

1.9. This consultation will close on 25 July 2022. We intend to publish all consultation responses 10 working days after this date. We aim to publish our decision by 18 August 2022.

How to respond

[5] Skye Dynamic Line Rating (DLR) (ssen-transmission.co.uk)
[6] RIIO-2 Transmission, Gas Distribution and Electricity System Operator Licence Conditions
[7] Re-opener Guidance and Application Requirements Document (ofgem.gov.uk)
[8] RIIO-2 Final Determinations – ET Annex (pg. 79, para. 4.49 – 4.58)
[9] RIIO-2 Final Determinations – SHET Annex (pg. 41, para. 3.72 – 3.75)
[10] Consultation on Scottish Hydro Electric Transmission's MSIP Re-opener (Beauly Dynamic Line Rating Project)

1.10. We want to hear from anyone interested in this consultation. Please send your response to to riioelectricitytransmission@ofgem.gov.uk.

1.11. We've asked for your feedback in relation to each of the questions in Chapters 3 - 5. Please respond to each one as fully as you can.

1.12. We will publish non-confidential responses on our website at www.ofgem.gov.uk/consultations.

Your response, data and confidentiality

1.13. You can ask us to keep your response, or parts of your response, confidential. We'll respect this, subject to obligations to disclose information, for example, under the Freedom of Information Act 2000, the Environmental Information Regulations 2004, statutory directions, court orders, government regulations or where you give us explicit permission to disclose. If you do want us to keep your response confidential, please clearly mark this on your response and explain why.

1.14. If you wish us to keep part of your response confidential, please clearly mark those parts of your response that you *do* wish to be kept confidential and those that you *do not* wish to be kept confidential. Please put the confidential material in a separate appendix to your response. If necessary, we'll get in touch with you to discuss which parts of the information in your response should be kept confidential, and which can be published. We might ask for reasons why.

1.15. If the information you give in your response contains personal data under the General Data Protection Regulation (Regulation (EU) 2016/679) as retained in domestic law following the UK's withdrawal from the European Union ("UK GDPR"), the Gas and Electricity Markets Authority will be the data controller for the purposes of GDPR. Ofgem uses the information in responses in performing its statutory functions and in accordance with section 105 of the Utilities Act 2000. Please refer to our Privacy Notice on consultations, see Appendix 4.

1.16. If you wish to respond confidentially, we'll keep your response itself confidential, but we will publish the number (but not the names) of confidential responses we receive. We won't link responses to respondents if we publish a summary of responses, and we will evaluate each response on its own merits without undermining your right to confidentiality.

General feedback

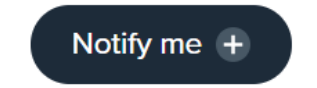
1.17. We believe that consultation is at the heart of good policy development. We welcome any comments about how we've run this consultation. We'd also like to get your answers to these questions:

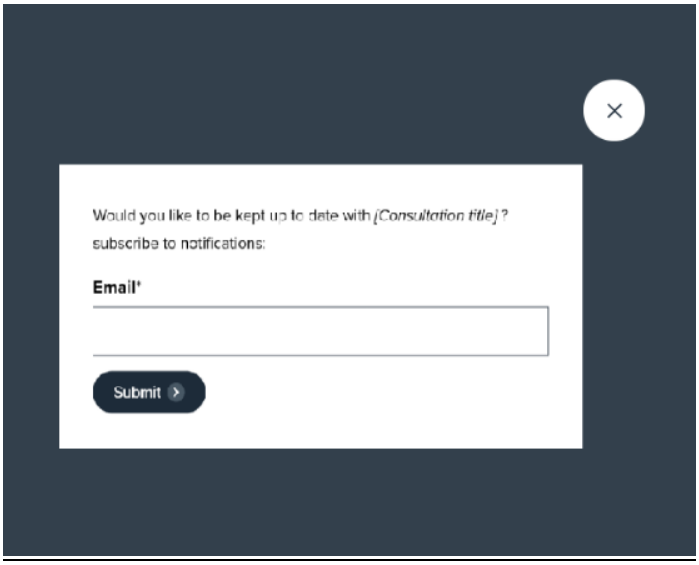
1. Do you have any comments about the overall process of this consultation?
2. Do you have any comments about its tone and content?
3. Was it easy to read and understand? Or could it have been better written?
4. Were its conclusions balanced?
5. Did it make reasoned recommendations for improvement?
6. Any further comments?

Please send any general feedback comments to stakeholders@ofgem.gov.uk

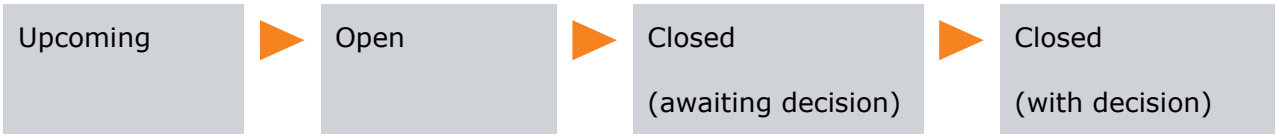
How to track the progress of the consultation

You can track the progress of a consultation from upcoming to decision status using the 'notify me' function on a consultation page when published on our website. Ofgem.gov.uk/consultations.





Once subscribed to the notifications for a particular consultation, you will receive an email to notify you when it has changed status. Our consultation stages are:



2. Assessment against Re-opener Requirements

Section summary

In this chapter, we set out our assessment of SHET's application against both the general re-opener application requirements and the specific requirements for the MSIP re-opener application.

Table 1: Re-opener application requirements

Document	Requirement	Has the requirement been met?
SpC 3.14	To relate to one of the activities defined in SpC 3.14.6	Yes
	To include a statement setting out which MSIP the application relates to (SpC 3.14.8(a)).	Yes
	To give details of the associated amendments to the outputs, delivery dates or allowances and an explanation of the basis of the calculation for any amendments requested to allowances (SpC 3.14.8(b)).	Yes
	To provide such detailed supporting evidence as is reasonable in the circumstances to justify the technical need including cost benefit analysis, impact assessments, risk mitigation, and engineering justification (SpC 3.14.8(c)).	Yes
	To provide an application with expected costs exceeding the Materiality Threshold but less than £100m. Costs must be limited to those incurred on or after April 2021. (SpC 3.14.9).	Yes
SpC 9.4	To prepare applications for re-openers in accordance with the Re-opener Guidance and Application Requirements Document.	Yes

RIIO-2 Re-opener Guidance and Application Requirements Document	Assurance requirements: - To provide applications that are accurate, unambiguous, complete and concise - To provide written confirmation from a suitable senior person of the same - To provide a point of contact for each application. (Paragraph 2.1 – 2.3)	Yes
	To publish applications within 5 working days of submitting it to Ofgem with only necessary redactions; unless this would pose a risk to national security. (Paragraph 2.4 – 2.6)	Yes
	To provide clear answers on: - Why an adjustment is justified - What that adjustment should be (Paragraph 3.1)	Yes
	To contain: - Alignment with overall business strategy and commitments - Demonstration of needs case/problem statement - Consideration of options and methodology for selection of the preferred option - The preferred option - Project delivery and monitoring plan (Paragraph 3.9 – 3.15)	Yes
	To contain an explanation of how stakeholder engagement contributed to the identification and design of the preferred option (Paragraph 3.16 – 3.18)	Yes
	To follow a style and structure that clearly and concisely sets out the evidence that licensees wish to present in support of their request (Paragraph 4)	Yes

2.1. SHET initially requested that costs associated with the installation of 7 DLR systems across its network be included in its baseline RIIO-2 funding. This request was rejected in our

RIIO-2 Final Determinations due to uncertainty over the costs of SHET's proposal and its dependency on the Transmission Communication Upgrade works.[11]

2.2. Ofgem decided that an uncertainty mechanism would be more appropriate and that SHET could apply for funding once sufficient progress on the Transmission Communications upgrade had been made and the cost and benefits can be clearly demonstrated.

2.3. Ofgem considers that the submission from SHET has met all of the requirements set out in both the applicable Special Licence conditions and the detailed re-opener application criteria set out in the RIIO-2 Re-opener Guidance as listed in Table 1 above.

2.4. In the following chapters, we set out our assessment in more detail and our minded-to position based on the evidence submitted by SHET.

[11] RIIO-2 Final Determinations – SHET Annex (Operational Protection Measures and IT Capex) (pg. 42)

3. Needs case for the proposed project

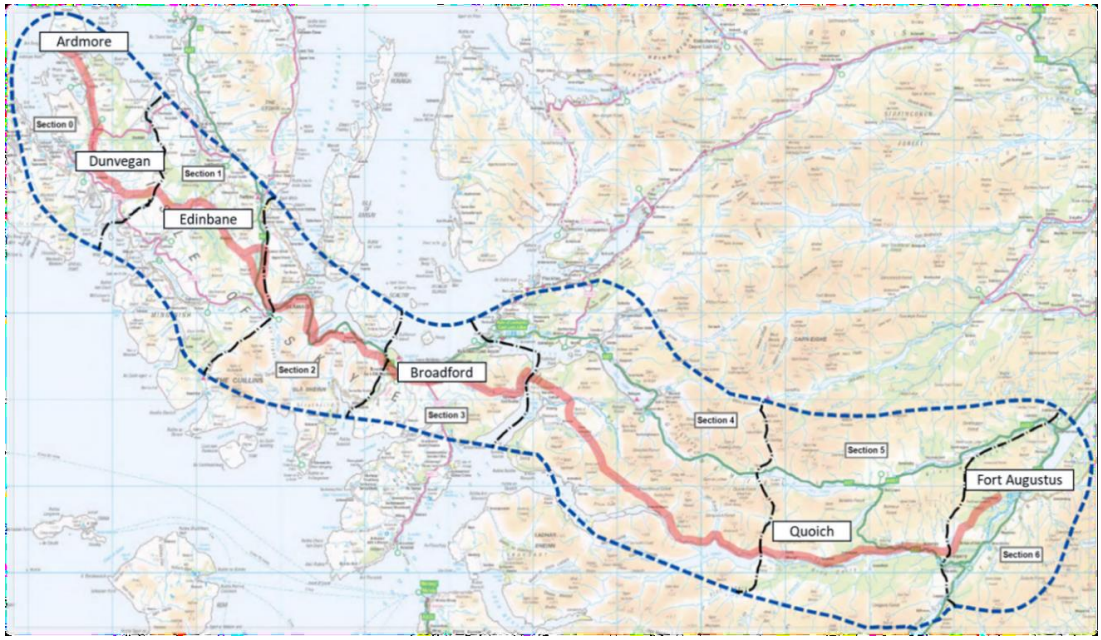
Section summary

This chapter summarises the needs case for the Skye DLR project and sets out our minded-to view on this needs case.

Question 1: Do you agree with our view on the validity of the needs case for the Skye DLR MSIP project?

3.1. The Skye transmission network consists of a single radial 132kV overhead line (OHL) extending over 160km. As shown below in Figure 1, it connects the 400kV substation at Fort Augustus on the mainland to Ardmore on the Isle of Skye.

Figure 1: The 132kV Skye Transmission line



3.2. Due to the level of generation proposed to connect to the system exceeding circuit capability,[12] SHET were granted a derogation from Ofgem in 2010 in relation to compliance with the Section 2 'Generation Connection' criteria of the System Quality and Security of Supply Standard[13] (SQSS) for the Western Isles, Skye and Lochaber area.[14] This area includes the 132kV Skye circuit.

3.3. As part of the derogation, we determined that a tranche of generation could be accommodated on an economic basis with management by the Electricity System Operator (ESO)[15] through the Balancing Mechanism (BM).[16] Therefore, the Skye 132kV circuit between Ardmore and Fort Augustus currently operates on a constrained basis with generators constrained off the system when the ESO predicts the circuit capability will be exceeded.

Table 2: Annual constraint volumes on the 132kV Skye circuit between Stornoway and Broadford

Reporting Year	Constrained Volume (MWh/annum)
Oct 2015 - Sept 2016	15,214
Oct 2016 - Sept 2017	10,823
Oct 2017 - Sept 2018	8,917
Oct 2018 - Sept 2019	14,547
Oct 2019 - Sept 2020	25,136
Oct 2020 - Sept 2021	2,309

[12] Circuit capability refers to the the limit on the volume of electricity which can be transmitted safely.
[13] Transmission licensees are required by their licences to comply with the SQSS, which sets out criteria and methodologies for planning and operating the GB transmission system.
[14] Western Isles: Derogation from standard condition D3 of the Electricity Transmission Licence (Transmission system security standard and quality of supply) (ofgem.gov.uk)
[15] The Electricity System Operator is the party with the responsibility for the second-to-second balancing of electricity supply and demand. It also has responsibilities relating to developing markets and advising on network investments.
[16] As electricity cannot readily be stored and must be manufactured at the time of demand, the Balancing Mechanism is used by the ESO to balance electricity supply and demand in each half hour trading period of every day by allowing increases or decreases to generation or consumption.

3.4. As shown in Table 2 above, the ESO have provided constraint volumes on the Skye 132kV Circuit from the STEDEXV1 group.[17] Costs for this constraint action were assessed using the Monthly Balancing Services Summary (MBSS).[18]

3.5. SHET presented its preferred long term reinforcement option to Ofgem under the Large Onshore Transmission Investment (LOTI) re-opener[19] on 16 December 2021 through the Skye 132kV Reinforcement Initial Needs Case. Our decision concluded that the preferred option put forward by SHET, a rebuild of the Fort Augustus to Ardmore 132kV circuit, was reasonable and likely to provide the optimal solution given the combination of non-load and load related drivers.[20]

3.6. Reinforcement is proposed to be completed by December 2025. According to SHET, there is therefore an opportunity to mitigate constraints on the existing circuit over a two-year period through installing DLR technology.

3.7. SHET states that the technical and operational learnings from the DLR installation on Skye will aid in the identification of further deployment opportunities in other areas of its network where constraints are expected to occur.

3.8. SHET has submitted a similar proposal for DLR installation on two sections of 275kV circuit in the north of Beauly.[21] SHET states that without the key learning experience gained through the execution of the Skye DLR project, the benefits of the north of Beauly DLR project are put at risk through implementation delays and availability of the system to the ESO.

[17] A designation which is used to refer to the sections of the Skye circuit from Stornoway to Broadford.
[18] This gives the costs and volumes of balancing services used by the ESO | Monthly Balancing Services Summary (MBSS) - Dataset | National Grid Electricity System Operator
[19] The Large Onshore Transmission Investments re-opener provides Electricity Transmission Owners (ETOs) with a route to apply for funding for large investments in the network, for example that may be required during RIIO-2 to meet decarbonisation or system reliability needs. Projects coming through the LOTI re-opener would not have been funded at the time of setting the price control due to insufficient certainty regarding their need, scale and/or timing.
[20] Isle of Skye - Decision on the project's Initial Needs Case and on its suitability for competition | Ofgem
[21] The Beauly DLR project seeks to mitigate constraints on two sections of 275kV circuit from Beauly to Loch Buidhe to Dounreay. Further information can be found in the 'Consultation on Scottish Hydro Electric Transmission's MSIP Re-opener (Beauly Dynamic Line Rating Project)' publication.

3.9. In addition to the proposed north of Beauly DLR project, SHET intends to identify and use DLR as part of at least two further projects before 2027 and allow for its introduction onto the rest of the network as business as usual. During engagement as part of the SQ process, SHET identified the two potential projects as being the Spittal Loch Beauly Transmission Owner Reinforcement Instruction (TORI) 109 project and the Beauly Blackhillock 275kV circuit.

3.10. SHET outlined in its MSIP submission the key learnings it expects to obtain from completion of the project. These are:

- Identification of preferred system(s) e.g. Active Network Management (ANM) system[22]
- Where best to site the monitoring equipment
- Identification of supporting Information and Communications Technology (ICT) and analytics platform
- Define costs for applying DLR system as retrofit to inform future projects
- Transfer to business as usual for use in optioneering

3.11. We have summarised the needs case for the approval of the Skye DLR project below:

- The need for experience in the deployment and operation of DLR against known constraints.
- The need to mitigate constraints on existing circuits in advance of planned reinforcement.

Our view of the needs case

3.12. As part of the rejection of the inclusion of the DLR projects within RIIO-2 baseline funding, Ofgem stated that SHET may wish to apply for funding for its DLR proposals once sufficient progress on the Transmission Communications upgrade has been made, and the cost and benefits can be clearly demonstrated.[23]

[22] Active Network Management systems monitor constraints in a defined area of the network in order to assist in allocating the maximum capacity available to customers in that area | Active network management - SSEN

[23] RIIO-2 Final Determinations – SHET Annex (Operational Protection Measures and IT Capex, page 42)

3.13. We consider that the costs and benefits of this project have not been clearly demonstrated and we are therefore minded-to reject the application to fund the delivery of the Skye DLR project. We have set out the rationale for our view below.

Deployment experience

3.14. The opportunity to gain deployment experience on a circuit with active constraints is presented as the primary needs case for this project. SHET stated that lessons learned by undertaking this project can be applied to future deployments, specifically to the north of Beauly DLR project.

3.15. We recognise the potential that DLR systems have in offering benefits to consumers by mitigating constraint costs across the GB electricity transmission system. However, given the costs associated with the project, we consider it is necessary that lessons learned through the Skye DLR project be clearly and feasibly linked to future projects. We also consider it necessary that the expected tangible benefits of this deployment experience are outlined clearly.

3.16. SHET submitted a project delivery timeline for both the Skye DLR project and the north of Beauly DLR project as part of its January 2022 MSIP submission. The Skye timeline lists the estimated end date for the commissioning of the Skye circuit following installation of the DLR system as 28 February 2023. As part of the project delivery timeline submitted for the north of Beauly DLR project, the estimated end date for commissioning of the circuit following installation of the DLR system is listed as 5 April 2023.

3.17. Given the 36-day difference between the commissioning dates, we had concerns about the feasibility of being able to apply lessons learned from the Skye DLR project to the north of Beauly DLR project.

3.18. As well as the feasibility of application of lessons learned, we did not consider that the tangible benefits of the deployment experience were detailed sufficiently within the MSIP application to justify the proposed costs of the Skye DLR project.

<u>Engagement with SHET</u>

3.19. We issued an SQ to clarify the process SHET has in place to apply the lessons learned from the Skye DLR project to other DLR projects in order to address our concerns around the

feasibility and tangibility of the benefits of these lessons. SHET's response can be found in 'Appendix 2 – SQ24'.

3.20. In addition to the SQ, a bilateral was arranged to further clarify the specific lessons learned and the plans SHET has in place to ensure they would be applied in line with the needs case presented for the Skye DLR project.

3.21. SHET provided us with a formal response following this meeting. This response contains the three areas discussed in detail during the session (the closeness of the delivery dates for the Skye and Beauly DLR projects, sufficient delivery confidence evidenced by separate DLR submissions and the possibility of liasing with other companies to develop best practices given DLR is not novel technology), as well as the SHET's responses in respect of each of the three areas. This is discussed below.

SHET's response to needs case concerns

3.22. In response to our concerns about the closeness of the delivery dates for both the Skye and the Beauly DLR project delivery dates, SHET stated that they have been purposely kept close together to allow the same personnel to be involved in both. In SHET's view, this allows for an easier transfer of learnings from Skye to Beauly.

3.23. We consider there are benefits to the transfer of knowledge between projects in terms of identifying and remediating issues relating to the deployment of DLR and applying these fixes to the Beauly project. However, many of the key decisions for the Beauly project will already have been made by the time there's any opportunity to apply operational learnings from the Skye project. Lessons that can be learned and applied within the short window between matching stages in both projects represent a limited portion of processes and systems required to implement DLR on a transmission circuit.

3.24. SHET also clarified that the project delivery timelines for the Skye and Beauly projects were at a relatively early stage of development. It added that as the projects progress, it has flexibility to move the north of Beauly date back, either to allow more time to understand issues on Skye or to adjust for longer-than-expected installation times.

3.25. We are only able to form a view on the basis of what has been submitted, i.e. the Gate 1 programme of development. The reasons cited for pushing back the delivery of Beauly

relate to issues on the Skye installation, which indicate that absent any issues with the project, the project delivery timeline will remain as presented within the MSIP submission.

3.26. SHET noted in its response that it considers the Skye and Beauly DLR projects to be intrinsically linked and dependent on each other.

3.27. While we recognise that the projects are similar in scope, we do not consider that the Beauly project is dependent on Skye. In our view, should the Skye project not go ahead, there would be no additional impediment to the Beauly DLR project.

3.28. In our bilateral meeting with SHET, we sought clarification on what, if any, cost efficiencies or risk mitigation would be achieved on the Beauly deployment as a result of the Skye project.

3.29. SHET confirmed that no material cost efficiencies had been identified or anticipated from the Skye deployment nor would any material risk mitigation be achieved as any failure of the Beauly deployment would result in the circuit defaulting from the increased capability resulting from the DLR system to regular static seasonal ratings.[24]

3.30. SHET proposed that components of the DLR technology could be re-purposed following the Skye 132kV circuit reinforcement. Specifically the ANM system, line measurement sensors and weather stations.

3.31. No firm details of the viability of redeployment opportunities were submitted as part of the MSIP application and we can therefore only deem them aspirational at this stage. We do not consider this to be sufficient justification for the significant costs involved in procuring and installing this equipment on the Skye circuit.

Constraint mitigation

[24] Static ratings refer to the maximum current which can be safely transmitted via an overhead line i.e. a level of transmitted current which will not lead to an infringement of ground clearance standards. This varies based on the operating temperature of the conductor. Ratings change throughout the year due to seasonal differences in ambient conditions.

3.32. We consider that there is a long-term need to mitigate constraints on the Skye 132kV circuit. The existing Skye circuit is oversubscribed, with a total of 137MW of generation connected on Skye and the Western Isles against peak demand of 53MW. As part of the decision on the Skye Initial Needs Case, we recognised that to enable the connection of future generation, reinforcement of the circuit will be required.[25]

3.33. As there are currently proposals to reinforce the Skye 132kV circuit by 2025, we do not view an interim solution to increase capacity as being necessary. It would offer a non-firm connection[26] and we therefore consider that reduction of constraint would have a limited positive impact in terms of reducing the associated constraint costs.

3.34. We therefore do not view constraint mitigation via the installation of DLR technology as appropriate justification for this project. The potential cost savings presented by SHET amount to £0.2m annually, approximately £0.5m for the period leading up to the Skye 132kV circuit being reinforced, which is significantly less than the estimated cost of the project.

Summary of our rationale for our minded-to decision to reject SHET's application for funding

3.35. Following a review of SHET's MSIP submission, as well as further engagement via the SQ process and bilaterals with SHET, we consider that the needs case presented for the Skye DLR project is not sufficiently robust to justify approval of the funding of the project.

3.36. SHET has stated that the intention of the Skye project is to develop the process and systems required to implement DLR on a transmission circuit. We consider that these processes and systems can be developed as part of the Beauly DLR project, which we view as having a more robust needs case and has more clearly identifiable benefits.

3.37. SHET also confirmed that should any issue be encountered as part of the Beauly project, it would be possible to revert to regular static seasonal ratings while the issue is investigated and resolved. This substantially diminishes the need to gain deployment

[25] Isle of Skye - Decision on the project's Initial Needs Case and on its suitability for competition: paragraph 2.8

[26] Non-firm means a connection which does not fulfil the requirements for a Firm connection i.e. a connection provided by one circuit with capacity constraints for the outage of any single item of plant, circuit or its associated equipment.

experience on the Skye DLR project with a view to mitigate potential issues on the Beauly DLR project as there would be no direct adverse impact as a result of faults with the proposed Beauly DLR system.

4. Assessment of options

Section summary

This section outlines the technical justification for the Skye DLR Project, along with a consideration of the alternative solutions reviewed by SHET. It also includes our minded-to position regarding these options.

Questions

Question 2: Do you agree with our technical assessment of the range of solutions to meet the needs case?

Question 3: Do you agree with our minded-to view on the solution proposed by SHET?

Engineering assessment of the range of solutions

4.1. To address the needs case drivers discussed in the previous chapter, SHET considered the following options:

- Do nothing
- Alterations to the Skye 132kV circuit
- Application of DLR on the Skye 132kV circuit

4.2. We have undertaken a technical review of the solutions considered by SHET, through the review of a variety of material including engineering justification papers and reports.

4.3. The material we reviewed comprised SHET's pre-engagement presentation materials, its submission under the MSIP re-opener and responses to our SQs.

Do nothing

4.4. SHET considered a 'do nothing' option as part of its optioneering. This would involve the ESO continuing to manage constraints on the Skye 132kV circuit until a long-term solution could be implemented to mitigate those constraints. SHET proposes that this could occur by December 2025 as part of the previously referenced Skye 132kV Reinforcement.

4.5. SHET rejected this option as the mitigation of constraints formed part of its submitted needs case for the Skye DLR project. Using the annual constraint volumes provided via the MBSS (see Table 2 in chapter 3), SHET calculates that a typical average annual constraint would be 14.9GWh. In arriving at this figure, it discounted the relatively low level of constraint observed in the 2020/21 period as this was substantially reduced due to the failure of the 33kV distribution cable between Ardmore on Skye and Harris on the Western Isles. It views that this is therefore a misleading figure to include.

4.6. SHET then used the MBSS to obtain an assumed average value for the cost associated with constraint of £82/MWh. This was combined with the average constraint to produce a cost associated with this option of approximately £1.22m in nominal terms, as compared to the constraint costs following implementation of the DLR solution of £1.02m. Further details on this comparison can be found in paragraphs 4.23 to 4.24.

Alterations to the Skye 132kV circuit

4.7. SHET considered whether it would be appropriate to alter the existing circuit to address the needs case. This would involve undertaking work to either reconductor, re-profile[27] or increase the operating temperature of the Skye 132kV circuit.

4.8. SHET rejected this option as any alterations would require the rebuilding of sections of the existing circuit. Given there is a proposal to fully rebuild the circuit to facilitate long-term reinforcement of the Skye 132kV circuit,[28] it did not believe that any of these options would be feasible due to the timescales involved.

[27] Conductors sag when they are required to transfer greater amounts of power due to the increase in operating temperature. Re-profiling describes work where the clearance height between conductor and ground is adjusted to ensure that safe clearance can be maintained. This can involve the changing of tower fittings, removal of vegetation or alterations to the tension of the conductor.
[28] Isle of Skye - Decision on the project's Initial Needs Case and on its suitability for competition | Ofgem

Application of DLR on the Skye 132kV circuit

4.9. SHET considered whether it could address the needs case through the use of DLR technology. This would involve the installation of two fleets of sensors, one set of weather sensors and one set of line or tower mounted sensors. These would feed information into an Active Network Management (ANM) system and be capable of providing an updated OHL rating every 15 minutes. Further details can be found in section 3.1.1 of SHET's Skye DLR MSIP application.[29]

4.10. SHET has assumed that the asset life for DLR is 15 years. It based this on its assumption for a typical lifetime for operational solutions which involve IT system architecture. Following assessment of the performance of the DLR system on the current Skye circuit, SHET stated that the DLR system will be considered for deployment on either the reinforced Skye 132kV circuits or an alternative circuit on its system that would benefit from increasing seasonal ratings.

4.11. As referred to in the SQ responses provided by SHET, it has identified two possible projects that could benefit from DLR – Spittal Loch Beauly TORI 109 and the Beauly Blackhillock 275kV circuit. SHET intends to assess the most appropriate circuit for redeployment of the DLR equipment nearer the point at which an enduring solution is implemented on the Skye circuit to reduce constraint. It predicts that it will have a clearer understanding of whether one of the circuits noted above would benefit from the application of DLR, or whether it would be more appropriate to deploy DLR on the reinforced Skye circuit in the event that the higher levels of generation predicted in the Skye 132kV reinforcement initial needs case materialise.

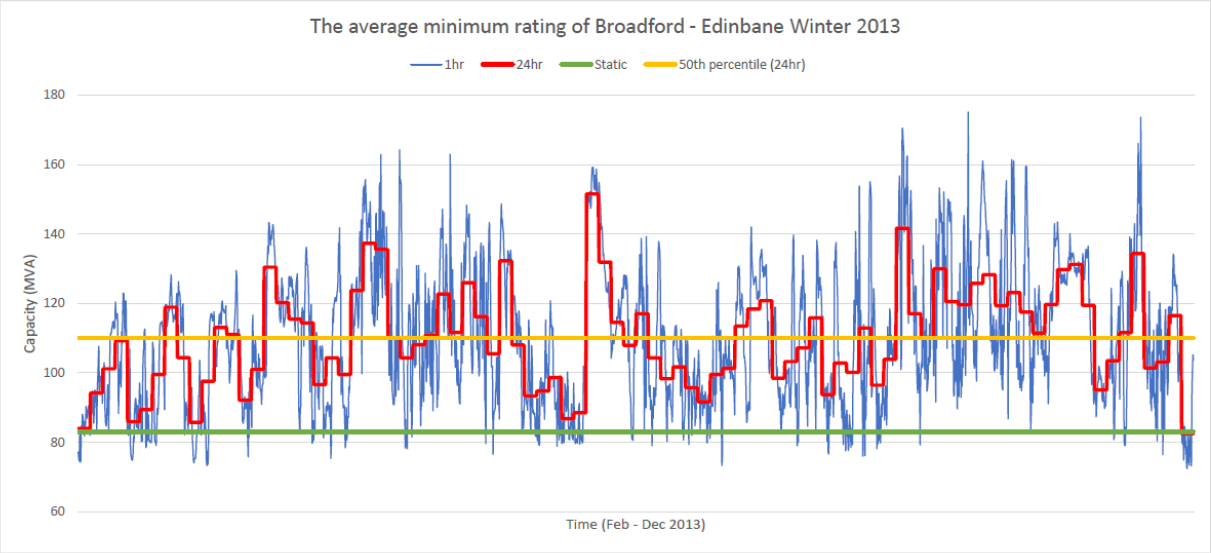
4.12. SHET preferred the option to deploy DLR as it believed it offered a means for constraint mitigation as well as DLR deployment experience. SHET provided further analysis as part of its submission to estimate the constraint mitigation that was possible with this solution. Details of this analysis have been included below.

Load flow analysis

[29] Skye Dynamic Line Rating (DLR) (ssen-transmission.co.uk) (pg. 12)

4.13. Using Met Office weather data from 2013, SHET carried out statistical analysis on a rating calculation model of the OHL to establish a credible seasonal rating increase to feed into the studies to determine seasonal capability uplift. 2013 was selected as this was considered a typical year and would therefore mitigate the impact of annual variability on the estimations. An example of this analysis has been included below in Figure 2.

Figure 2: Example of analysis undertaken to determine seasonal DLR rating



4.14. For each day of summer, spring, autumn, and winter in 2013, SHET calculated the average minimum rating for DLR. The median calculated seasonal rating for winter, spring/autumn, and summer corresponded to ratings of 110MVA, 98MVA, and 86MVA respectively. SHET selected the median ratings as it considers this provides a rating which is neither overly optimistic nor pessimistic on the potential application and benefit of DLR.

4.15. The analysis resulted in a rating increase relative to the 'do nothing' option of 21MVA, 21MVA, and 19MVA for winter, spring/autumn, and summer respectively. The results of the comparative analysis has been included below in below in Table 3.

Table 3: Seasonal uplifts on the Edinbane to Broadford 132kV Circuit

Option	Delivery Date	Winter Uplift (MVA)	Spring/Autumn Uplift (MVA)	Summer Uplift (MVA)
Do nothing	N/A	-	-	-
DLR	2023	+21	+21	+19

4.16. SHET then used the seasonal uplifts calculated in Table 3 and an assumed generation profile for all connected generators on the Western Isles, Skye and Fort Augustus circuit to calculate the potential reduction in constraint. This load flow analysis[30] predicted a 17% reduction in the constraint volume over the length of the Skye 132kV circuit.

Ofgem's view of the potential solutions

4.17. Having considered the range of solutions presented by SHET, we are satisfied that it has considered an appropriate range of options to address the needs case (although see Chapter 3 for our views on the need for this project).

4.18. We view that the the 'do nothing' option is technically viable. However, it does not capitalise on the primary element of the stated needs case, i.e. the opportunity to gain deployment experience with a DLR on a circuit with known constraints.

4.19. We view the option to make adjustments to the circuit through reprofiling, reconductoring or a change in the operating temperature of the OHL would be inappropriate. As there is currently a proposed reinforcement option which would replace the circuit entirely in 2025, we consider that any replacement in advance of this would be inefficient and impractical.

4.20. Of the solutions, we are minded-to agree that the installation of DLR technology on the Skye 132kV circuit would be the optimal solution in the event that we were to view the needs

[30] This is a method that is used to determine the steady state operating characteristics of a power system network.

case as valid. It would enable SHET to gain DLR deployment experience as well as mitigate constraints.

4.21. We consider that the DLR solution would have the secondary benefit of potential constraint cost mitigation in advance of planned reinforcement. However, as outlined in our assessment of the needs case, we do not view this as sufficient justification for approval of the project.

4.22. The constraint mitigation, and consequently the reduction in constraint cost, would be limited, resulting in an estimated reduction of constraint costs of £0.2m per year. This is significantly smaller than the estimated cost of the project and therefore would be of limited consumer benefit.

Economic assessment of options

4.23. SHET provided Ofgem with its estimation of the costs associated with pursuing a 'do nothing' option as compared to the implementation of DLR. It applied the 17% constraint volume reduction calculated as part of their load flow analysis (see paragraphs 4.13 to 4.16) to the average annual constraint volumes observed on the Skye 132kV circuit. By combining this with the assumed average constraint costs SHET obtained via the MBSS (£82/MWh), it estimates an annual reduction in constraint costs by £0.2m.

Table 4: Constraint reduction Edinbane to Broadford 132kV Circuit

Option	Total Constraint (Average) MWh	Constrained volume Reduction	Estimated annual constraint cost (£m)
Do nothing	14,925	-	1.22
DLR	12,387	-17%	1.02

4.24. We do not view the estimation of the cost savings to be sufficiently robust to support the approval of this project. There are a number of assumptions made which compromise the accuracy of the final value, namely the discounting of the 2020/21 constraint volumes from the average annual constraint volume on the Skye 132kV circuit and the assumptions relating

to average constraint costs. Cost savings may be possible but further evidence would be required before we could take a view on this.

Our minded-to view of SHET's preferred option

4.25. Our review has concluded that both the 'do nothing' option and the DLR solutions are technically feasible. However, our minded-to view is that SHET's proposed DLR project represents the optimal solution to address the needs case that SHET identified.

4.26. However, for the reasons discussed in Chapter 3, we do not consider that the needs case is sufficiently robust to justify the approval of the Skye DLR project. Therefore, we are minded to reject SHET's preferred option of deploying DLR technology on the Skye 132kV circuit.

4.27. The following chapter analyses the costs for this project that have been submitted for consideration by Ofgem.

5. Cost assessment of the proposed project

Section summary

This section outlines our proposed approach to the assessment of the submitted costs associated with the Skye DLR project and our rationale in arriving at this approach.

5.1. At the time that the Skye DLR project was submitted in the January 2022 MSIP submission window, SHET was seeking approval of the efficient costs in addition to approval of the needs case and optioneering.

5.2. Following an initial review of the submitted costs, we consider that it would be more appropriate to adopt a two-stage approach instead, i.e. a decision on the needs case and optioneering followed by a decision on the costs of the project after more detailed costs are submitted in the January 2023 MSIP submission window in the event that the needs case and optineering is approved. We have set out the rationale for this view below.

Initial cost submission

5.3. SHET submitted estimated costs for the Skye DLR project as part of its January 2022 MSIP submission. SHET stated that this estimate has been developed in line with its costing methodology and in accordance with its Large Capital Project (LCP) Governance process. The project components have been included below in Table 5.

5.4. As we are not consulting on the efficient costs of the project at this stage, specific costs of the project components have not been included in Table 5. Indicative costs are subject to change following the submission of detailed costs in the January 2023 MSIP submission window in the event that the project progresses to the second stage of the approval process.

Table 5: SHET's project components and estimated costs for the Skye DLR project

Project Components	Estimated Costs (£m)
DLR Equipment	[redacted]
DLR System Design	
DLR Installation	
DLR Commissioning	
DLR Decommissioning	
ANM System	
Risk & Pre-construction	
Opex Escalator Allowance	

5.5. Within its MSIP submission, SHET stated that the estimates provided were calculated by an internal Flexible Solutions Team (FST) and were based on 'high-level assessment, local knowledge and experience, the scope and site-specific information available, and the assumptions listed [in section 6.4]'.[31]

5.6. Following an initial review of the submitted materials, we did not consider that the process used to derive the estimated cost of the project was laid out clearly within the MSIP submission. Specific sources used by the FST to support the estimates had not been included.

Revised project costs

5.7. A total of 20 SQs relating to project costs were sent to SHET. These SQs largely sought clarity on the process that the FST used in arriving at their estimates and a requested any supporting sources for these estimates.

5.8. Given the volume of SQs, SHET was given the opportunity to resubmit costs in their entirety which took into account the queries raised by the SQs and included appropriate details of the sources used to derive the estimated costs of the project. SHET engaged with a

[31] Skye DLR MSIP Submission | SSEN Transmission

number of suppliers to obtain more robust and well-evidenced estimates for the project components listed above in Table 5.

5.9. Following SHET's engagement with the suppliers, a revised set of cost estimates were obtained. However, SHET noted in a subsequent bilateral with us that the estimates were more varied than initially expected.

Revised cost assessment approach

5.10. We consider that it would be in the interests of consumers to assess the costs of the Skye DLR project as part of a further detailed cost submission in the January 2023 MSIP submission window.

5.11. In our view, the variation in estimates obtained by SHET from the third-pary suppliers has the potential to leave consumers exposed to potential gains and losses. Taking an average DLR unit cost which has been calculated using highly varied estimates to drive an allowance could lead to outperformance or overspend for SHET. It would therefore be preferable to assess costs once greater cost certainty can be achieved.

5.12. Additionally, SHET noted that a two-stage approval process will enable it to undertake a trial of DLR technology. This trial can then inform subsequent cost estimates and ensure that they are more robust. Details of any proposed trials have not been supplied by SHET at this stage.

6. Consultation proposal summary

6.1. We are proposing to reject the needs case for the Skye DLR project and the preferred option presented by SHET to address this needs case. We view that the needs case is not sufficiently robust to justify the approval of the project.

6.2. Table 6 below details the project components of the Skye DLR project as identified by SHET. Specifics of the work packages have been redacted for commercial sensitivity. For the reasons outlined in Chapter 5, indicative costs are subject to change following the submission of detailed costs in the January 2023 MSIP submission window in the event that the project progresses to the second stage of the approval process and therefore have not been included at this stage.

6.3. Allowances and and adjustments to the funding requested by SHET (as set out in Table 6 below) will be proposed following the assessment of the efficient costs of the project. This assessment will be undertaken following the submission of detailed costs in the January 2023 MSIP submission window in the event that the needs case and optioneering are approved. Final approval of the project is subject to approval of the efficient costs.

Table 6: Requested allowances for SHET's Skye DLR project

Project Components	SHET Request (£m)	Ofgem Proposed Adjustments (£m)	Ofgem Proposed Allowances (£m)
DLR Equipment	[redacted]	N/A	N/A
DLR System Design		N/A	N/A
DLR Installation		N/A	N/A
DLR Commissioning		N/A	N/A
DLR Decommissioning		N/A	N/A
ANM System		N/A	N/A
Risk & Pre-construction		N/A	N/A
Opex Escalator Allowance		N/A	N/A

7. Next steps

7.1. We welcome your responses to this consultation, both generally, and in particular on the specific questions in Chapters 3, 4 and 5. Please send your response to riioelectricitytransmission@ofgem.gov.uk. The deadline for response is 25 July 2022.

7.2. We aim to conclude our assessment of SHET's Skye DLR project with a decision on the needs case and optioneering in August 2022. If our initial view does not change through the consultation and re-opener assessment processes, our decision will confirm our provisional view that the needs case and preferred option in addressing have not been approved.

7.3. If our minded-to views change and we consider that the needs case and preferred option should be approved, we will progress to the second stage of the review process with an assessment of the efficient costs of the project. This will be undertaken after a secondary cost submission provided by SHET in the January 2023 MSIP submission window.

7.4. In the event that we consider that SHET should be funded for this project, it will be categorised as an evaluative Price Control Deliverable (PCD), in line with the conditions set out in SpC 3.14. We would then expect to initiate a statutory consultation to make the relevant changes to Appendix 1 of SpC 3.14 (the Medium Sized Investment Project Price Control Deliverable) in order to specify the outputs, delivery dates and associated allowances for the Price Control Deliverable.

Appendix 1 – Consultation questions

Question Number	Question
1	Do you agree with our view on the validity of the needs case for the Skye DLR Project?
2	Do you agree with our technical assessment of the range of solutions to meet the needs case?
3	Do you agree with our minded-to view on the solution proposed by SHET?

Appendix 2 – SQ24

Supplementary Question:

When outlining the benefits of the proposed project, you state: "[The Skye DLR project]... will be a crucial part of providing learning ahead of the proposed deployment on North of Beauly". You also say that "without gaining key learning and experience through the Skye DLR, the clear benefits of the North of Beauly DLR are put at risk". Given the commissioning of the Skye DLR is scheduled for 28th Feb 2023 and the commissioning of the Beauly DLR is scheduled for 6th April 2023, there appears to be limited potential for lessons learned from the Skye project to be meaningfully applied in the Beauly project.

Please provide details of any plans you have in place to apply the key learnings you expect to gain from the Skye DLR project (found in section 2.2 of the MSIP submission) to the Beauly DLR project.

The response to this question will be used to aid Ofgem in our assessment of the needs case for this project.

SHET Response:

As both the Skye and North of Beauly DLR projects are administered using our Large Capital Projects (LCP) governance they share learnings through regular RISK, SHE and Lessons Learned workshops. By keeping the timeframes reasonably close together (approximately 5 weeks between commissioning dates), this ensures that the same personnel can be involved in both projects allowing for better flow of lessons learned into the North of Beauly DLR project whilst still allowing sufficient time to implement any required changes. Specific examples include:

- A trial of equipment is planned to select the most appropriate device, however the installation on the Skye circuit will be the first time our OHL, installation and commissioning engineers have worked with and followed the required procedures to install DLR devices. The learnings from installation on Skye can directly inform the North of Beauly project and any amendments to procedure can be made without incurring any time delays or affecting the quality of the completed system.
- The Skye project will be the first time that the designated locations, based on the work performed in collaboration with the Met Office, will have been put into practice. On

completion of the Skye installation, any issues or errors can be avoided on the North of Beauly installation ensuring a quality system is in place for the first fully operational DLR of its type on the transmission network.

- Interaction between the DLR and its associated ICT, ANM, and analytics platforms can be assessed, and any issues remedied prior to the North of Beauly installation. This will avoid any potential delays and ensure quality of data communication.

As well as lessons learned from installation, another key learning between the two projects will be on setting up appropriate communication with the ESO on line rating. Skye is a radial circuit (connecting into the Main Interconnected Transmission System (MITS) at Fort Augustus substation) which already operates under a constrained condition with a derogation granted. This provides an opportunity to demonstrate system coordination with the ESO while considering actual constrained conditions on a relatively straightforward circuit. This is a lower risk installation with which to develop the system with the ESO, before installing on a more complex MITS circuit such as North of Beauly where it will have direct value to consumers. Given that more generation and demand customers will benefit from the application of DLR to North of Beauly, this means there is also additional risk to both us and the ESO on the operation of the system. This risk is mitigated by applying DLR to Skye first. While the North of Beauly DLR system will commission in 2023 to allow for a period of evaluation and monitoring, constraints aren't expected to occur until 2024 which means that lessons learned from Skye will continue to be shared beyond commissioning and before generators will be exposed to the North of Beauly DLR system.

The completion costs for the Skye project will immediately inform our work to identify future DLR deployments (anticipating that a further two projects will be identified before 2027). Additionally, experience of the decommissioning costs and time frame will inform all future DLR deployments.

Appendix 3 – Privacy notice on consultations

Personal data

The following explains your rights and gives you the information you are entitled to under the General Data Protection Regulation (GDPR).

Note that this section only refers to your personal data (your name address and anything that could be used to identify you personally) not the content of your response to the consultation.

1. The identity of the controller and contact details of our Data Protection Officer

The Gas and Electricity Markets Authority is the controller, (for ease of reference, "Ofgem"). The Data Protection Officer can be contacted at dpo@ofgem.gov.uk

2. Why we are collecting your personal data

Your personal data is being collected as an essential part of the consultation process, so that we can contact you regarding your response and for statistical purposes. We may also use it to contact you about related matters.

3. Our legal basis for processing your personal data

As a public authority, the GDPR makes provision for Ofgem to process personal data as necessary for the effective performance of a task carried out in the public interest. i.e. a consultation.

3. With whom we will be sharing your personal data

We do not intend to share your personal data with any third parties.

4. For how long we will keep your personal data, or criteria used to determine the retention period.

Your personal data will be held for six months after the project, including subsequent projects or legal proceedings regarding a decision based on this consultation, is closed.

5. Your rights

The data we are collecting is your personal data, and you have considerable say over what happens to it. You have the right to:

- know how we use your personal data

- access your personal data
- have personal data corrected if it is inaccurate or incomplete
- ask us to delete personal data when we no longer need it
- ask us to restrict how we process your data
- get your data from us and re-use it across other services
- object to certain ways we use your data
- be safeguarded against risks where decisions based on your data are taken entirely automatically
- tell us if we can share your information with 3rd parties
- tell us your preferred frequency, content and format of our communications with you
- to lodge a complaint with the independent Information Commissioner (ICO) if you think we are not handling your data fairly or in accordance with the law. You can contact the ICO at https://ico.org.uk/, or telephone 0303 123 1113.

6. Your personal data will not be sent overseas

7. Your personal data will not be used for any automated decision making.

8. Your personal data will be stored in a secure government IT system.

9. More information For more information on how Ofgem processes your data, click on the link to our "Ofgem privacy promise"