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Ofgem
10 South Colonnade
Canary Wharf
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25 July 2022

Dear Jack,

Consultation on Scottish Hydro Electric Transmission's (SHET's) proposed Skye Dynamic Line Rating Medium Sized Investment Project (MSIP)

We are pleased to enclose a response from SSEN Transmission¹ to Ofgem's consultation on the Skye Dynamic Line Rating (DLR) MSIP.

As GB transitions to a low carbon economy, a significant quantity of renewable generation will need to connect to our network, requiring new and innovative solutions to be deployed to operate and respond to the challenge. DLR is one such solution which can increase the current carrying capacity on the overhead line (OHL) in our area, either as a retrofit or as part of new circuit builds, providing potentially significant benefit to GB consumers by mitigating network constraints and aiding the ESO in managing the system. The Skye 132kV circuit between Fort Augustus and Ardmore currently operates on a constrained basis, with generators constrained off the system when circuit capability is expected to be exceeded. Ahead of the proposed reinforcement of the Skye 132kV circuit², there is a unique opportunity to install and monitor DLR technology for the first time on our network to better understand the technology through monitoring of performance against active constraints.

We welcome the opportunity to respond to the consultation, however we do not agree with Ofgem's minded-to position to reject the proposed Skye DLR project. We note Ofgem's key concern with the validity of the needs case is the limited opportunity to apply learnings from Skye DLR to Beaulieu DLR given the close commissioning timeframes between the two projects. Ofgem also notes that the processes and systems required to implement DLR on a transmission circuit as business as usual can be developed as part of the Beaulieu DLR project, if Skye DLR were to be rejected. We have provided additional justification within our response to the consultation questions to address these concerns. In responding, we would highlight:

- Skye 132kV circuit is already constrained and therefore provides an opportunity to demonstrate system coordination with the ESO while considering actual constrained conditions. While the

¹ References to SSEN Transmission encompass the licenced entity Scottish Hydro Electric Transmission plc Registered in Scotland No. SC213461.

² Skye 132kV reinforcement is currently being assessed via the Large Onshore Transmission Investment (LOTI) reopener. Ofgem published an INC decision in April 2022 which was supportive of the need for the project, however the project is yet to receive final regulatory approval.

Beaulieu DLR system will commission in 2023, it will not be fully operational until the expected constraints on the north of Beaulieu circuit occur in 2024. This means that despite the 37-day difference between commissioning dates, there is an additional 12-month period in which lessons from the constrained Skye circuit can be transferred to the Beaulieu DLR system before generators are exposed in 2024.

- The differences between the characteristics of the Skye 132kV circuit and the north of Beaulieu 275kV circuit represent an opportunity to gain insight into challenges across different types of circuit on our network. By deploying both DLR systems, we will be able to compare the performance of DLR on both types of circuits and minimise the risk of encountering knowledge gaps when progressing with future DLR projects that may be on wood pole circuits.
- These differences also mean that there are specific lessons which can be learned on Skye that cannot be obtained through the Beaulieu DLR system.

We have provided further detail on each of these points within Appendix 1 below.

Please do not hesitate to get in touch should you wish to discuss any aspect of our response.

Yours sincerely,

Cara Dalziel
Senior Regulation Analyst

Appendix 1: Response to consultation questions

1. Do you agree with our view on the validity of the needs case for the Skye DLR Project?

No, we do not agree with Ofgem's view on the validity of the needs case for Skye DLR. We have set out our reasons below.

Unique characteristics of Skye circuit

Skye is a radial 132kV circuit, comprising trident pole line, connecting into the Main Interconnected Transmission System (MITS) at Fort Augustus substation which currently operates under a constrained condition with a derogation granted. This is different from north of Beaulieu, a MITS circuit, which is currently not constrained and is the main power corridor to export from north to south. These differences are important for several reasons.

Firstly, given the fact that Skye is already constrained this provides an opportunity to demonstrate system coordination with the ESO while considering actual constrained conditions. While the Beaulieu DLR system will commission in 2023, to allow for a period of evaluation and monitoring prior to constraints occurring (as currently forecast) on the north of Beaulieu circuit in 2024. This means that there is a longer period in which to transfer learnings from the constrained Skye circuit before generators are exposed to the Beaulieu DLR system.

Secondly, the radial Skye circuit is a lower risk installation on which to develop the system with the ESO versus north of Beaulieu's more complex MITS circuit. More generation and demand customers will benefit from the application of DLR on north of Beaulieu, however this means there is an additional risk to both us and the ESO on the operation of the system. This risk is mitigated by applying DLR to the relatively straightforward Skye circuit first. Ofgem has noted in the consultation that there would not be any material risk mitigation for north of Beaulieu by deploying Skye first. While we do not expect there to be a material impact on existing customers (i.e., outages) from issues arising with Beaulieu DLR, it will mean that generation contracted to connect on north of Beaulieu circuit will be blocked until reinforcement. Given the scale of generation contracted to connect north of Beaulieu, alongside the current imperative to accelerate our transition to low-carbon generation and meet our strengthened renewable energy targets, we consider this to be a significant risk.

Lastly, beyond the learnings obtained for north of Beaulieu, Skye will provide insight into challenges that may be experienced elsewhere on the network should DLR be expanded across multiple circuits as part of business as usual in the future. The Skye 132kV circuit is currently a trident pole line and we expect that this type of circuit could see the most benefit from DLR in the future, given that a trident pole design is typically used for wind farm connections. Producing a procedure for installation of DLR on a 132kV trident circuit will therefore be of benefit to future trident connections that we may wish to utilise DLR on. This is particularly pertinent given the differences between circuits using wood pole versus steel transmission towers. The significantly lower height of wood pole means that it is much more affected by wind shear and turbulence due to orography. This difference could affect the relative performance of DLR on each design type and lead to knowledge gaps if Skye DLR is not progressed, limiting the certainty of applying DLR to future wood pole circuits.

Lessons learned

The aim of the Skye DLR project is to trial the first use of DLR on transmission system. Rejection of our MSIP application will inhibit our ability to inform and de-risk north of Beaulieu and future projects. While acknowledging Ofgem's view that learnings for future projects could be taken from Beaulieu DLR should Skye DLR not proceed, the difference between Skye and Beaulieu circuits means that there are a number of areas where we can only obtain learnings from the Skye DLR system. These include:

- Development of the procedure and technique for installation of DLR equipment on wood poles and considerably lighter conductors.
- Experience of implementing DLR on a radial circuit which does not cross a transmission boundary which, as noted above, is very typical of a modern wind farm connection.
- The difference in elevation of build for wood poles versus that of steel towers provides an opportunity to compare the performance in both applications. As we've noted, there is a risk that gaining experience on only steel towers will lead to knowledge gaps when progressing with future DLR projects.
- Experience of utilising DLR in areas of challenging terrain with limited communications network coverage. As such, it is likely that the application of novel systems, such as LoRa, would be likely. Skye DLR system would facilitate the assessment of the robustness of these systems within the DLR framework and inform us of the viability of DLR in remote locations (which is particularly pertinent in our network area).
- Given the planned Skye 132kV reinforcement, we will gain experience in not only decommissioning the DLR system, but also of recommissioning the DLR equipment on an alternate circuit.

Ofgem has also highlighted the close commissioning timeframes for the Skye and north of Beaulieu projects and noted concerns over whether there is sufficient time for learnings to be transferred between the two. We would reiterate that keeping project timelines close together allows for easier transfer of learnings between the two projects. The Skye and Beaulieu DLR projects will share knowledge and resource throughout the development process, through regular risk, Safety Health, and Environment (SHE), and lessons learned workshops. While the commissioning timeframes are close together (based on our Gate 1 programme), there is a longer time period between the early development phases (up to 2-3 months) which allows additional time to pass on learnings to north of Beaulieu in these key development phases.

Furthermore, while the Beaulieu DLR system will commission in 2023, it will not be fully operational until the expected constraints on the north of Beaulieu circuit occur in 2024. This means that despite the 37-day difference between commissioning dates, there is an additional 12-month period in which lessons from the constrained Skye circuit can be transferred to the Beaulieu DLR system before generators are exposed in 2024. These would be operational learnings, rather than deployment experience, such as understanding Information and Communication Technology (ICT), Active Network Management (ANM) and analytics platforms, as well as communication pathways between our control room and the ESO.

Redeployment opportunities

As Ofgem has noted within the consultation, our intention is to apply learnings from Skye to future DLR projects in addition to north of Beaulieu. Given that Skye DLR is intended to be a short-term solution until Skye 132kV circuit is reinforced, we plan to redeploy the DLR equipment to either a

future project, or to the reinforced Skye 132kV circuit if the higher levels of generation predicted materialise. We aim to carry out two further overhead line projects before 2027 before ultimately updating the overhead line specification. That specification will then be our standard for all suitable overhead line projects in the future - be they refurbishments or new builds. Future projects will then be DLR enabled from construction, enabling deferment of any subsequent reinforcement without having to go through any specific funding applications.

We note Ofgem's concern that we cannot provide firm details of those two additional projects at this moment in time and that these are viewed as 'aspirational'. As we have stated throughout our engagement, the suitability of circuits for future DLR deployment will need to be assessed once we have gained learnings from Skye and north of Beaulieu. Skye and Beaulieu DLR will be the first time we design, install, and monitor DLR technology and therefore it is appropriate for future DLR projects to remain aspirational until we can assess the success of deploying DLR on the transmission network and better understand the technology. We have already taken steps to identify two potential circuits which will continue to be assessed for potential DLR deployment as we learn more from Skye and north of Beaulieu projects. Additionally, it is appropriate that we do not firm up plans at this early stage to allow time to better understand the expected constraint conditions so that we are redeploying the DLR equipment to a circuit where it will provide the most benefit to customers.

Potential constraint mitigations

We note Ofgem's view that it does not consider constraint mitigation as an appropriate justification for the project given that potential cost savings are lower than the overall project cost. Recognising the short-term nature of the project ahead of the Skye 132kV reinforcement, we have always maintained that reduced constraints are a secondary benefit of the proposed Skye DLR and that the benefits of the project should not be assessed solely on economics. We would reiterate that when considered against the sunk cost of the project (i.e., cost of trialling equipment, designing the installation process, communications and ESO engagement) given that the intention is to redeploy the equipment, the gap between cost savings and project cost reduces considerably as set out within our engagement during the SQ process. We currently estimate the sunk cost to be approximately £1m, meaning that the gap between cost and potential savings reduces to £0.5m (compared to a difference of £2m when considering total project cost).

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

We agree with Ofgem's assessment that the installation of DLR technology on the Skye 132kV circuit would be the optimal solution to meet the needs case. However, we would like to note our disagreement with Ofgem's view the economic assessment of options. Ofgem has highlighted concerns on the assumptions used to illustrate potential cost savings on Skye. On discounting the 2020/21 constraint volumes, we reiterate that this was the appropriate approach to calculate an accurate view of expected average constraints over the project's lifetime given that the failure of the Ardmore to Harris 33kV cable was an exceptional event. We have been clear throughout the submission and subsequent engagement that our analysis is intended to be demonstrative. It would not have been appropriate or proportionate to carry out a CBA given the limited time window for constraint relief and that the primary benefit of the project to provide valuable learnings would not be captured within a CBA.

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

No, we do not agree with Ofgem's minded-to view to reject the preferred option of deploying DLR technology. We note that Ofgem's key concern is the validity of the needs case and have set out our response to those specific concerns within Q1.