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Shetland HVDC - 600 vs 800MW paper

Dear Sirs,

We are pleased to offer a response to SHET's request received via E-mail dated 2019-11-05 and 2019-11-07 to present a brief paper from ABB outlining the impacts that the potential change to the Shetland HVDC link project from 600MW to 800MW would have on the Shetland HVDC link.

This paper addresses the following topics:

- Study package that would need to be re-run to confirm if the multi terminal system could accommodate the change
- Time schedule and process for conducting the studies
- Outline costs to carry these out

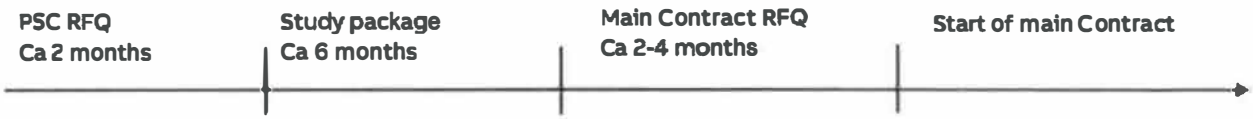
1 Study package

The studies that would need to be done to confirm if the multi terminal system could accommodate the change are described in the attached Memo 1JNL750255 Shetland HVDC Link - Impact of higher power rating

2 Time schedule and process

2.1 Overview

The proposed approach is to agree on a new PSC for the scope of the study package before the findings are incorporated into the contract for the ECC.



2.2 New PSC Contract

The studies needed to assess the impact of increasing the power from 600 MW to 800 MW is described in the attached Memo 1JNL750255 Shetland HVDC Link - Impact of higher power rating. Prior to entering any tendering work for the ECC contract there is a need to conduct pre ECC contract studies under a new PSC contract. There must be time allocated for SHET to produce an ITT package for this new PSC and for the Contractor to respond to this ITT including negotiations up to signing of the PSC contract. The studies are estimated to be performed for 6 months and an additional ITT time of 2 months is foreseen.

2.3 Pre-ECC contract

The basis for the ECC contract shall be an agreement between the parties as a result of a negotiation of a revised tender from ABB based on an updated ITT from SHET confirming the change in rating.

The contractual activities under the Advanced Works contract to progress the civil design for the 600 MW solution could be re-used to a large extent for the 800 MW solution. However, there is still a need to verify that the deliverables under the above contract are still valid for the 800 MW solution.

The current target to have contract signing in April 2020 is not realistic. There is a need for further 2-4 months from release of the revised ITT for the ECC contract to accommodate enough time for re-design, engagement with supply chain and negotiations before contract signature.

2.4 ECC Project delivery

The currently tendered delivery schedule shall be amended to reflect the new scenario. A final delivery schedule could be optimized during the above negotiations to accommodate for some of the impacts due to change of rating within the overall delivery schedule.

However, it must be noted that the current delivery schedule is based on that most parts of the Shetland system design has been performed under the CM contract resulting in less amount of time allocated to system design at the start-up of the project compared to a change in rating.

The current assessment is the above-mentioned PSC will accommodate these changes, but the full impact is only possible to confirm after the PSC is performed.

2.5 Costs

Costs associated with the Engineering hours to perform the above mentioned studies are estimated to [redacted]

In addition and depending on the contractual set up of the new PSC we see a need for a similar project organization as used in the ongoing PSC contract including Project Management and support functions yet to be negotiated and possibly other engineering functions if the result of the studies shows we need to alter the work done under the ongoing PSC contract. These costs are not included above.

3 Assessment of CM warranty and performance guarantees

This assessment is valid for the scenario where the Shetland HVDC Link is changed to an 800 MW solution.

If the Shetland HVDC Link is re-designed and constructed with an 800 MW rating the impact on the delivery time schedule will be such that, at the time when the Shetland HVDC Link is taken into commercial operation, the CM HVDC system warranty period and performance guarantee verification period have most likely expired.

For the unlikely scenario, where the warranty period and performance guarantee verification period have not expired, the following aspects and potential impacts needs to be further assessed:

In order to have the Shetland HVDC Link capable to operate with the CM HVDC system in an 800 MW scenario it is foreseen that parts of the CM HVDC system must be upgraded. Therefore, it must be further assessed and agreed how the upgraded parts shall be integrated without having an impact on the remaining part of the performance guarantee verification period, e.g. any outage due to the upgraded equipment shall be a non-relevant outage.

During the period when the CM HVDC system upgrade work is ongoing; the performance guarantee verification shall be stopped and shall re-commence at a time when the upgrade works have been completed including a burn-in period.

Further, it must be assessed and agreed how a separate equipment warranty covering the upgraded and/or replaced equipment shall be applied.

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The performance guarantee verification of the Kergord converter station under the Shetland HVDC Link contract shall, in any rating scenario, be performed in point-to-point operation with either of the CM HVDC system stations. However, the performance guarantee verification shall be done for Kergord converter station only and as such separated from the CM HVDC system. Therefore, in a scenario where the CM HVDC system still have an ongoing performance guarantee verification period it must be further assessed and agreed how the two separate performance guarantee verification periods can be run partly in parallel.

Yours sincerely,

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