Q1. Technical need

Your submission is based on the needs case for reconductoring of the YY and XY circuits. Please specify the limiting fault and subsequent overload on the circuit, the minimum additional capacity required on each circuit to solve this overload and whether this is on the OHL or cable circuits for each of the different generation backgrounds you have considered

A1**.** In both cases, we consider the maximum possible transfer capacity required from each route (i.e. continuous summer rating where demand and OHL ratings are lowest and generation is at a maximum. The need to uprate both circuits does not depend on faults upstream.

In terms of the YY Route, the reconductoring is required to accommodate additional wind generation connecting to Mark Hill. The YY circuit was sized to accommodate the Moyle Interconnector for a maximum transfer to/from Northern Ireland of 500MW. Since installation in 2002, technical issues will the link have restricted operation by a half and the spare capacity has since been occupied by wind generation.

The contracted generation shown in the CBA generation case, in accordance with latest Ranking Order, indicates 493MW of wind generation by 2018, and 565MW by 2022. When coupled with our contractual maximum import of the interconnector (80MW), the transfer capacity of the YY Route between Mark Hill and Coylton is 638MVA in 2018 and 718MVA in 2022, based on our current contracted position.

In order to facilitate the above increase in required capacity (>200MVA), the most viable option aside from reconductoring is the new build of a single-circuit in parallel with the YY Route – shown as the "Baseline option" in the CBA model.

In terms of the XY Route, the need to uprate was identified in the RIIO-T1 Business Plan but the significantly increased level of generation means greater transfer capacity is required. The original plan was to use twin-Rubus at 90° to achieve 2 x 1020MVA capacity.

The pre-fault summer rating of the XY route is principally restricted to 640MVA by a small section of cable although the OHL rating is 740MVA. The cable section will be removed and replaced by a Gas Insulated busbar arrangement, with a rating of 1900MVA, and is already funded through the RIIO-T1 allowance. The OHL will be replaced with twin-bundle ACCR HTLS circuit with a rating of 1,600MVA, and provides the maximum uprating obtainable without requiring tower reinforcement.

The initial plans in 2011 were based on the best view of generation at the time and heavily dependent on the New Cumnock infrastructure connecting to Coylton to be built under the SWS Project. Since then, the contracted generation for potential export through the XY Route has risen from 1300MW to 2000MW by 2023 and, whilst the true amount and timing of the some of this generation may be uncertain (i.e., in gaining consent), the original twin-Rubus double circuit is highly unlikely to be sufficient once the New Cumnock infrastructure is completed.

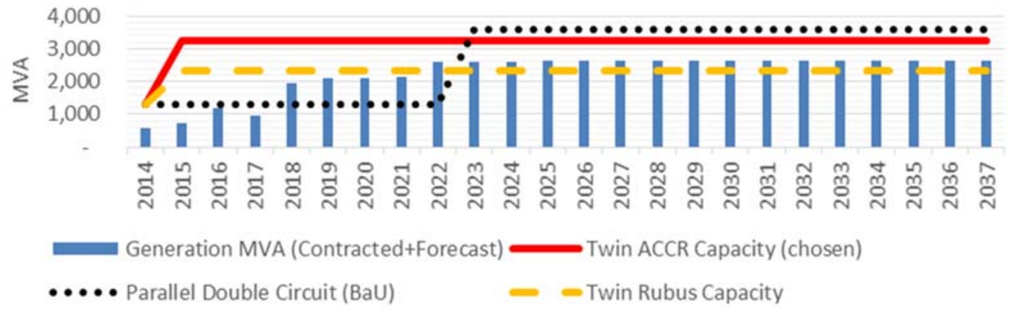

Figure 1. Capacity and contracted generation into Coylton (XY Route)

Q2. Technical

On page 5 of your submission you mention route XY existing capacity to be 640MVA to be upgraded to 1600MVA following the application of HLTS. Is this a pre-fault winter or summer rating? On page 10 of your submission you then mention the pre-fault summer rating of the XY route to be 640MVA and to be upgraded to 1160MVA. Please reconcile the figures on page 10 to those presented on page 15.

A2. The figures quoted on page 5 (640MA and 1,600MVA) refer to the pre-fault summer ratings. (Note, the ratings for the HTLS conductors are constant across all seasons).

The question refers to the sentence below, which refers to the rating increase achieved using twin-Rubus conductor, as per the original plan in the SWS Project, set out in 2011.

> *The original proposal to uprate the XY Route, as part of the SWS Project, replaced the existing OHL conductor (twin Zebra, 2x400mm2 ACSR) with a larger conductor (twin Rubus, 2x500mm2 AAAC), achieving an OHL increase in the pre-fault summer rating from 640MVA to 1,160MVA per circuit.*

Q3. Technical

On Page 13 of your submission you mention that there is very little performance data on this technology. You go on to claim that there is no evidence of failure in the past 10years. Please supplement your submission with a piece of work highlighting where the technology has been applied, a brief description of the environmental conditions, whether these are similar to the region you are appliying the reconductoring, date of commissioning, rating, length and any failures as well as their cause (or in this case no failures). This is to verify SPT due diligence and understand the project's eligibility based on "proven technology" criteria

A3. SPT would reiterate that there is little long-term performance data on the technology although there are a wealth of examples on the 3M website (link) documenting the where ACCR technology has been installed across the world.

Reliability and safety are of paramount importance and the adoption of a new technology such as this requires substantial testing and evaluation and pass SPT's approval process before it can be deployed with complete confidence. As discussed in the main IRM application, SPT have assessed and discussed HTLS technology over previous years, holding many discussions with NGET and SHETL regarding their mechanical and electrical trails of the technology. SPT have also visited the French TO, RTE, to discuss their experience of the technology.

As this is a relatively new technology there is little performance data in the public domain from industry users, but from SPT's investigations there have been no reported failures that would raise questions of reliability.

As the composite core is the key innovation of this technology, the difference in climate will not be a factor. The key difference between SPT and the examples on the 3M website is there terrain, but this will predominantly affect the requirements of the tower structures used to carry the conductor and, given the similar size and weight to conventional ACCC, there are no concerns in this respect.

Q4. Technical need

Have you considered technologies such as quad boosters over reconductoring. Please evidence why this is not sufficient to provide the additional capacity?

A4. As the XY Route is the only exit route for the South West region of Scotland, there are no alternative routes where the power could be diverted to. Aside from building a new circuit, the uprating of the XY Route is the only means to export the additional power.

In terms of using the quad boosters to divert power from the XY Route Circuit 1 to the XY Route Circuit 2 would reap no significant benefits as the two circuits have similar capacity limits (640MVA and 740MVA) and would therefore only achieve a 50MVA increase.

Q5. Technical need

Does the underground cable on the XY route constrain the circuit? Under what outage/fault condition? What is this being reconductored to? What will be the new capacity?

A5. The underground cable section on Circuit 1 of the XY route is a limiting factor of the route. As part of the SWS Project 2011 plan the Cable and OHL elements were both identified for replacement, driven by the additional generation into Coylton (via New Cumnock and Mark Hill).

The underground cable will be removed and replace with a GIS busbar with a rating of 1900MVA.

Q6. Technical need

The circuit ratings provided seem to be mostly pre-fault summer ratings. Is your assessment based on a summer generation assumption rather than a winter peak assumption? In this case is it a N-2 or N-3 assessment? If it is an N-3 assessment have any i/trips or constraint levels been identified?

A6. The circuit ratings presented in the IRM application are focused on the pre-fault summer rating as the limitation of the region is the export capacity, and this is most constrained when the generation is high, the demand is low and the rating of the OHL conductors and cables are at their lowest.

Given the radial nature of the double circuit, and the significant increase in generation, only local N-1 and N-2 conditions were considered to assess the level of constraint on new generation. Assessment of the wider MITS system beyond Kilmarnock South, although raises other issues such as

B6 Boundary constraints, is out with the scope of these two schemes. N-3 analysis has not been carried out as these are not considered to be secured events under the NETS SQSS.

Q7 Technical need

Is the generation background you have used purely contracted or have you used best view or any other industry backgrounds such as gone green etc…

A7. The generation forecast presented (5GW in SPT by 2021) is based on the current level of contracted generation, in accordance with the latest version of the Ranking Order, and aligns with the Gone Green scenario as of 2011.

The submitted CBA models include the ability to model the impact of additional generation connected to the region in the future years in order to examine the impact on circuit capacity. For the IRM submission, an additional 200MW is modelled to connect to Mark Hill by 2025, above what is in the Ranking Order. This figure is hypothetical but demonstrates potential generation that could be facilitated by the headroom offered by the ACCR HTLS.

SPT appreciate that the true level and timing of the generation in the Ranking Order is, in part, dependant on planning consent and therefore subject to change. SPT believe this highlights a key challenge faced by the TO - efficiently planning network reinforcement where long-term generation forecasts are uncertain - but rather than casting doubt on the validity of the generation forecast, SPT believe it actually supports the case for HTLS reconductoring as a tool to enable TOs to manage the uncertainty more effectively.

Q8 Cost

The funding request is for £27.13m. The project cost is £44.5m. How has the additional funding been provided and which mechanisms have been triggered?

A8. In the RIIO-T1 submission, an allowance of £17.4 was attributed to the OHL reconductoring of the XY route (based on twin-Rubus). The allowance is deducted from the IRM project cost of £44.5m.

The funding of £17.4 will be recovered from the allowance through the annual RRP adjustments under Licence Condition 6F.

Q9 Cost

The cost of your OHL contract on page 17 is £42m. The project cost on 2 is £44.5m. Please explain the difference.

A9. These two figures do not refer to the same expense.

[redacted]

Q10.Cost

As part of the project, substation works will be required. Are these submitted within your funding request through IRM?

A10. No additional substation works will be required for the YY Route reconductoring as the standard 275kV switchgear in situ is rated above 1,100MVA.

Substation works for the XY Route (new switchgear at either end?) was allowed for in the SWS Project and plans have not changed to accommodate the HTLS conductor.

As such, no substation works will be funded by the requested IRM allowance.