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Date: 22 July 2014

Dear Colleague,

Decision on the Needs Case assessment for the proposed Caithness Moray electricity transmission project under Strategic Wider Works

The Caithness Moray project involves a subsea cable between Caithness and Morayshire as well as associated onshore reinforcements. It is forecast to cost around £1.2 billion and is needed to allow the connection of additional renewable generation in northeast Scotland.

We consulted in April on our initial assessment of the Needs Case[1] for this project, and have considered stakeholders' responses. We still think there is a need for reinforcing the transmission network in northeast Scotland. We also think the solution proposed by Scottish Hydro Electric Transmission plc (SHE Transmission), a subsea HVDC cable to be delivered by 2018, is the right first step to reinforce the network in northeast Scotland. Although there are inherent uncertainties and risks associated with the proposed project, we consider it to be in consumers' interests, so we have accepted the Needs Case, subject to there being no material increase in SHE Transmission's estimated project costs.

We are currently assessing SHE Transmission's detailed Project Assessment and plan to consult on the funding proposals in late October.

The remainder of this letter covers:

- The proposed Caithness Moray reinforcement
- Our April consultation on the Needs Case
- Stakeholders' consultation responses and our views
- Updated information since April from SHE Transmission and our views
- Our assessment of the Needs Case for the Caithness Moray project
- Our decision on the Needs Case
- Project Assessment and Next steps
- Annex 1

[1] The Needs Case Assessment is the first stage in a two stage assessment under the Strategic Wider Works process. To find out more about the process please review our published guidance (https://www.ofgem.gov.uk/publications-and-updates/guidance-strategic-wider-works-arrangements-electricity-transmission-price-control-riio-t1-0)

The proposed Caithness Moray reinforcement

In 2013 SHE Transmission submitted a proposal to deliver a reinforcement in northeast Scotland by 2018. It involves a High Voltage Direct Current (HVDC) subsea cable between Caithness and Morayshire and related onshore works. The project is estimated to cost approximately £1.2bn and is expected to bring 1.2GW of new renewable generation by 2030. It would deliver an additional 800MW and 850MW of transmission capacity across the transmission system boundaries B0 and B1 respectively. There are more details about the proposed reinforcement and the potential alternatives in Annex 1.

Our April consultation on the Needs Case

In April 2014 we consulted on our Needs Case assessment[2]. In our assessment, we found there was a need for reinforcing the transmission network in northeast Scotland but said the case for SHE Transmission's proposed solution, a subsea cable, was finely balanced. SHE Transmission's own analysis showed that an onshore reinforcement (one not involving a subsea cable) may provide greater benefits to consumers. But other factors needed to be considered. The onshore reinforcement would be delivered eight years after the subsea cable, which could negatively impact investor confidence, developers' plans for new generation in the area, and the opportunity to contribute to the UK's 2020 renewable targets. We discussed the uncertainty over the cost and timing of the onshore options because of likely problems with getting planning consents. This in turn meant that the estimated net benefits of the onshore reinforcements were unclear.

In our consultation we also asked SHE Transmission to do more work to:

- undertake further sensitivity analysis of the cost and timing of the onshore reinforcement options
- revisit the constraint modelling constraint costs used in its cost-benefit analysis
- quantify the wider benefits of the proposed reinforcement
- demonstrate the "optionality benefit" of its proposed solution[3].

Stakeholders' responses to consultation

We received 25 responses from stakeholders to our consultation[4]. The key points were:

- All 25 responses strongly supported SHE Transmission's proposed reinforcement[5].
- One respondent said we should examine whether the proposed reinforcement could be delivered more efficiently through a **competitive framework**.
- Almost all respondents commented that SHE Transmission's proposal will result in the **timely deployment of renewables** in the region. Some also said that if the proposed solution was rejected, there would be a wider negative impact on **investor confidence**, as the alternative could only be completed eight years later.
- Some respondents argued that if the subsea cable wasn't built, its absence would undermine the development of the **tidal industry** in GB and the **regional economy**.

[2] https://www.ofgem.gov.uk/electricity/transmission-networks/critical-investments/strategic-wider-works/caithness-moray

[3] SHE Transmission had argued that it could wait until the offshore subsea cable was built and then take a view as to whether an additional reinforcement across B1 was needed

[4] There is a detailed summary of responses to our consultation published alongside this document. It is entitled, "A summary of consultation responses"

- Most respondents highlighted **drawbacks of an onshore reinforcement**, including: the risk that the delay in deployment could be even longer than assumed, problems with construction outages which could increase costs and delays, as well as the likelihood of missing 2020 renewable targets.
- Finally, some of the respondents raised the higher **visual amenity impacts** associated with building an onshore reinforcement.

Our view on the points raised by stakeholders

We have carefully considered responses to the April consultation to inform our decision on the Needs Case. We respond to each of these points in turn below.

- **Competitive framework**: We are currently considering the possibility of introducing a competitive tendering regime for the onshore networks under the ITPR project. However, if we decide to introduce competition onshore, this will take time to develop and implement, and we don't think it would be in consumers' interests to delay the delivery of this reinforcement.
- **Timely deployment of renewables and investor confidence**: We agree that SHE Transmission's proposed solution provides near-term certainty of grid capacity for projects waiting to connect to the grid. We think the proposed subsea cable would better facilitate new generation and contribute to the UK's low carbon pathways and commitments in the near term than an onshore option with a later delivery date. We also acknowledge the risk that an eight-year delay could negatively affect investor confidence and result in a lower generation deployment.
- **Impact on the tidal industry and regional economy**: We support economic investment in Britain's energy infrastructure where it can benefit existing and future GB energy consumers. However, it is for government to decide on policies to promote economic development in specific industries and regions. We recognise that the investment could help facilitate long term technical development (eg marine generation on Orkney). This could be to the benefit of consumers and is considered later in the section on wider benefits.
- **Drawbacks of the alternative onshore solution**: There are risks an onshore solution could be delayed by more than eight years and the outages required could result in further delays and costs. The onshore option would also significantly restrict the amount of new renewable generation in the area that could contribute to the UK's 2020 targets.
- **Visual Amenity impacts**: An onshore option would have a greater impact on visual amenity than the subsea cable proposal. We acknowledge this is an important issue for some stakeholders and is a relevant consideration in assessing the proposal.

Updated information from SHE Transmission

During the consultation period, SHE Transmission worked to address the areas of concern highlighted in our April consultation. We summarise below the additional information provided in each area.

- **Onshore option costs:** SHE Transmission developed a more detailed route for an onshore reinforcement option. This included additional mitigation works (eg undergrounding of cables, installing bird diverters) to address areas of sensitivity along the route and facilitate planning consent. SHE Transmission also revised upwards its cost estimates for an onshore option and reintegrated these costs into its cost-benefit analysis.

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- **Constraint Costs:** In response to the analysis on constraint costs from our consultants (Pöyry), SHE Transmission revised its modelling to adopt a dynamic constraint cost approach. SHE Transmission's changed its annual constraint costs over the period. In its original assumption it assumed that constraint costs would be £130/MWh, with a lower sensitivity of £100/MWh. In its latest submission constraint costs range from £95/MWh to £130/MWh, with an average of £123/MWh.
- **Optionality of the "wait and see" approach:** SHE Transmission has provided no further evidence or analysis to support "a wait and see" approach which it had argued in its original submission. The analysis continues to show that there is no positive option value in taking this approach as the second stage reinforcement is always needed under the scenarios considered.
- **Wider benefits:** SHE Transmission undertook work paid for through the Network Innovation Allowances (NIA) on visual amenity impacts. The analysis used stakeholders' willingness to pay estimates based on a study of the visual amenity impacts of the Beauly Denny project. SHE Transmission has identified £164m of residual visual amenity detriment which would be avoided if the subsea cable was built instead of the onshore alternative. In addition, SHE Transmission also argued that £58m (2013 prices) of additional carbon benefit associated with the subsea cable solution should be included. It said this represents a "social cost of carbon" valuation, associated with displacing CO_2 emissions.
- **Weighted Average Cost of Capital (WACC):** SHE Transmission adjusted the WACC used in its cost-benefit analysis from 6.25% to 4.6% to reflect the finance parameters in its RIIO-T1 settlement.[6]

Our views on the new evidence provided by SHE Transmission

We have assessed the further analysis SHE Transmission provided during the consultation. We agreed with its findings in some areas but took a different view in others.

- **Onshore alternative's option costs**: We found the work done by SHE Transmission on producing a detailed route for the onshore alternative was both useful and informative. But we think SHE Transmission's assumptions about the high unit cost and volume of undergrounding are too pessimistic, and have therefore decreased the onshore alternative's estimated costs by £100m[7] in the cost-benefit analysis.
- **Constraint Costs**: There is a lot of uncertainty around the future cost of constraints. Forecast values greater than £95/MWh depend on assumptions that bids accepted by the system operator to manage constraints include a large margin above the foregone generation revenue or cost of generating replacement energy. In our view, forecast values in excess of these costs are not an appropriate measure of the reinforcement's economic value to consumers. Accordingly we have adopted the lower forecast of constraint costs in SHE Transmission's analysis (c.£95/MWh). One advantage of this is that it provides a strong test of the reinforcement's economic case. This value is also consistent with the expected future revenue of

[6] The Weighted Average Cost of Capital is used in the cost-benefit analysis to model the allowed revenue of an investment under the price control and hence the actual costs to customers of a proposal over its lifetime.
[7] The reductions have come about as a result of scrutiny of SHE Transmission's estimated costs. Most of the estimated savings have come from our view that: the unit cost of the 275kV underground cable was high, the amount of undergrounding required for the 275kV cable was overestimated, the unit cost of the 132kV underground cable was also high as was the assumed level of contingency.

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new wind generation from a £90/MWh strike price (CfD) plus a £5/MWh Climate Change Levy exemption certificate.[8]

- **Optionality of the "wait and see" approach**: All the analysis presented to date suggests that consumers would receive greater benefits if the subsea cable was followed with a downstream reinforcement on the B1 boundary. Therefore we do not see any evidence that the argued optionality benefit exists.
- **Wider benefits**: We think SHE Transmission's quantification of visual amenity impacts is a useful addition to the cost-benefit analysis, particularly when the expected impacts from the subsea proposal and an onshore option differ so significantly. We are broadly satisfied that the survey methodology used to estimate stakeholders' willingness to pay has followed sound principles. But it is difficult to validate the reported values. For the additional carbon benefits, we do not think that it represents a valid approach for use in a cost-benefit analysis. The measure is flawed. So, we have excluded the additional £58m from our analysis.
- **WACC**: We agree with adjusting the WACC in the cost-benefit analysis to align with the value set in the RIIO-T1 settlement (4.6%). The new figure provides a better estimate of actual costs to consumers that the company will be able to recover under its regulated revenues. The impact of the change is not immaterial, adding approximately £500m of consumer benefits, to all options, under each scenario.

Our assessment of the Needs Case for the Caithness Moray project

We reviewed SHE Transmission's submission in the round, including the additional evidence it has provided since the consultation. We have also considered the views of our consultants and those of stakeholders who responded to our consultation.

Economic assessment of Caithness Moray proposal

SHE Transmission's cost-benefit analysis included a range of scenarios, sensitivities and options. A key factor for the proposed project's overall consumer benefit is the amount of new generation expected to be deployed in the area. Under the central Slow Progression scenario, around 1.2GW of new generation is expected to be deployed by 2030. Generation scenarios spanning from Reduced Deployment to Going Green have also been included to test the robustness of the proposal.

Across the range of generation scenarios, SHE Transmission's proposed solution (Option 1a) shows strong positive consumers benefits (from £130m-£1523m), with the central case showing £776m of consumer benefits (see Table 1). When SHE Transmission's proposed solution is combined with a downstream reinforcement, benefits increase significantly (eg £564m increase under Slow Progression). These results are broadly similar to the consumer benefits of an onshore alternative (Option 2b).

[8] In 2013 the average bid price accepted by the system operator to constrain off wind generators in northern Scotland was £100/MWh.

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Table 1 – Net consumer benefits of reinforcement options[9]

Option (£m, 2013 prices)		Generation scenario			
		Slow Progression (Central Scenario)	**Gone Green**	**Slower Slow Progression**	**Reduced Deployment**
1a: Offshore subsea cable with associated onshore works		**776**	**1,523**	**171**	**130**
1b: Offshore subsea cable with associated onshore works + downstream reinforcement		1,340	2,372	292	251
2b: Onshore option + downstream reinforcement, *with Visual Amenity impacts*		1,240	2,195	285	298
2b: Onshore option + downstream reinforcement, *without VA impacts*		1,404	2,359	449	462
Difference between Options 1b and 2b	With VA impacts	100	178	7	-48
	Without VA impacts	-64	14	-157	-211

Visual Amenity and Wider Benefits

When the monetised impacts of visual amenity are included in the analysis, the proposed HVDC subsea cable has greater overall consumer benefit than an onshore option in the majority of scenarios. If these costs are excluded, the ranking is reversed. For some stakeholders, visual amenity impacts are a significant issue. We agree that these are relevant for the cost-benefit analysis and we also see this approach consistent with our duty to have regard to people living in rural areas and the impact of electricity network infrastructure on the environment.

There are potentially additional positive impacts of the proposal that are difficult to quantify and incorporate within the aggregate monetised cost-benefit analysis. These include strategic and long-term sustainability considerations. For example, the proposed HVDC subsea cable is a "game-changer" in the area as it will provide certainty about grid capacity before 2020. Up to 1.2GW of new wind farm connections depends on this network upgrade, and the reinforcement brings consumer benefits under a range of scenarios. For this reason, the HVDC subsea cable would better facilitate new generation in the area. It would contribute more to the UK's low carbon pathways and medium term commitments (eg 2020 targets) than an onshore option with a later delivery date. There are also some longer-term sustainability considerations (eg out to 2050). For example, the HVDC subsea cable will diversify the transmission routes out of northern Scotland which would provide greater system security and resilience. It could also help facilitate long-term technology

[9] Modelling input assumptions: A £95/MWh cost of constraints; a 4.6% Weighted Average Cost of Capital and 3.5% Social Rate of Time Preference; a £100m cost reduction for the onshore alternative; discounted over 40 years.

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development, such as marine generation around Orkney, in a cost efficient manner and market participant diversity on the Scottish islands as well as mainland Scotland.

Risk

There is a risk given the magnitude and technical scope of the proposed HVDC subsea cable that the actual outturn costs of the project could turn out to be higher than our view of the efficient costs and allowed expenditure. We have considered the possible impact on cost and delay, based on our experience of similar projects and have looked at the potential impact on consumers (as a change in consumer benefits) if there were problems with the manufacture, installation of the cable, or the commissioning of the project.

We have also considered the potential impact of the risks associated with an onshore alternative solution. If the scope of works were increased to get planning consent, eg to include additional mitigation measures such as undergrounding, this would result in higher project costs and be reflected in the funding allowances. In addition, planning issues with an onshore option and a delay around future grid capacity could increase uncertainty for developers. This is likely to reduce investor confidence by increasing financing risk premiums and ultimately increase the likelihood of a weaker generation scenario and result in lower overall benefit from a reinforcement.

We think the risks to consumers are lower in the proposed solution than in the alternative onshore option. This is because the main risks associated with the subsea cable are likely to occur during the construction phase and would be mitigated to some extent by being shared with or borne by SHE Transmission or its contractor. The earlier delivery date also means that a delay will not have as much impact on consumer benefit as delays post 2020, as new generation (and the volume of potential constrained generation) will build up between 2018 and 2025.

Our decision on the Needs Case

To justify the Needs Case for a new SWW proposal, transmission owners must show what would happen without the proposed reinforcement, ie the status quo, or if other feasible alternatives are taken forward instead. This comparative analysis provides a strong test that the proposal is in the interests of consumers. It does not provide a range of options from which we can choose. Our decision on the Needs Case must be on the specific proposal put forward.

Based on our assessment we don't think there is a strong case to reject the proposed reinforcement in SHE Transmission's Needs Case submission.

- We consider there is a clear **need** for the reinforcement. There is a significant amount of generation that wants to connect in the area, but is currently unable to due to the lack of transmission capacity. Given the amount of generation with connection contracts, consented, under construction or already connected, there is a high degree of certainty that an additional reinforcement is required.
- Our initial assessment suggests that the **technical scope** of SHE Transmission's proposed reinforcement is appropriate. However, as part of the Project Assessment, we are undertaking a more detailed review of the technical scope, to make sure that the costs are efficient.

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- The detailed least worst regrets analysis also suggests that the **timing** for the subsea cable and associated onshore works is in consumers' interests.
- The consumer benefits of the subsea cable and associated onshore reinforcements plus a further downstream reinforcement are significant and at a similar level to that of an onshore option.
- When visual amenity and the other wider benefits mentioned in this paper are considered, this strengthens the case for the subsea cable and a further downstream reinforcement. Moreover, although the subsea cable has risks that could reduce the expected consumer benefits, there are measures that will help reduce the impacts on consumers to some extent.
- In contrast, the risks of an onshore option could potentially have a larger negative impact on the overall consumer benefit and would be more difficult to mitigate.
- Overall, we think that the proposed solution is likely to be in the **interests of existing and future consumers**.

In conclusion, having taken into account the risks of the project and alternatives, we conclude that the proposed subsea cable is the right first step in a two-step reinforcement because it has similar benefits to the onshore option, with less downside risks for consumers. This is why **we have decided to accept the Needs Case for SHE Transmission's proposed subsea cable and associated onshore works, subject to there being no material increase in project costs.**

Next steps

We are still currently assessing SHE Transmission's detailed Project Assessment. This process focuses on whether the costs of the proposed reinforcement are efficient, whether there are appropriate risk sharing arrangements, and if the technical scope (including the detailed route of the subsea cable) and delivery plans are appropriate.

We are currently assessing the information provided by SHE Transmission and intend to consult on the Project Assessment and funding proposals in late October.

Given the magnitude of the project we are considering whether to allow SHE Transmission to start recovering the revenues in 2015/16 and how this could be achieved.

Please send any questions about the content of this letter to Anna Kulhavy or Adam Lacey via SWW@ofgem.gov.uk.

Yours sincerely,

Kersti Berge

Partner – Electricity Transmission

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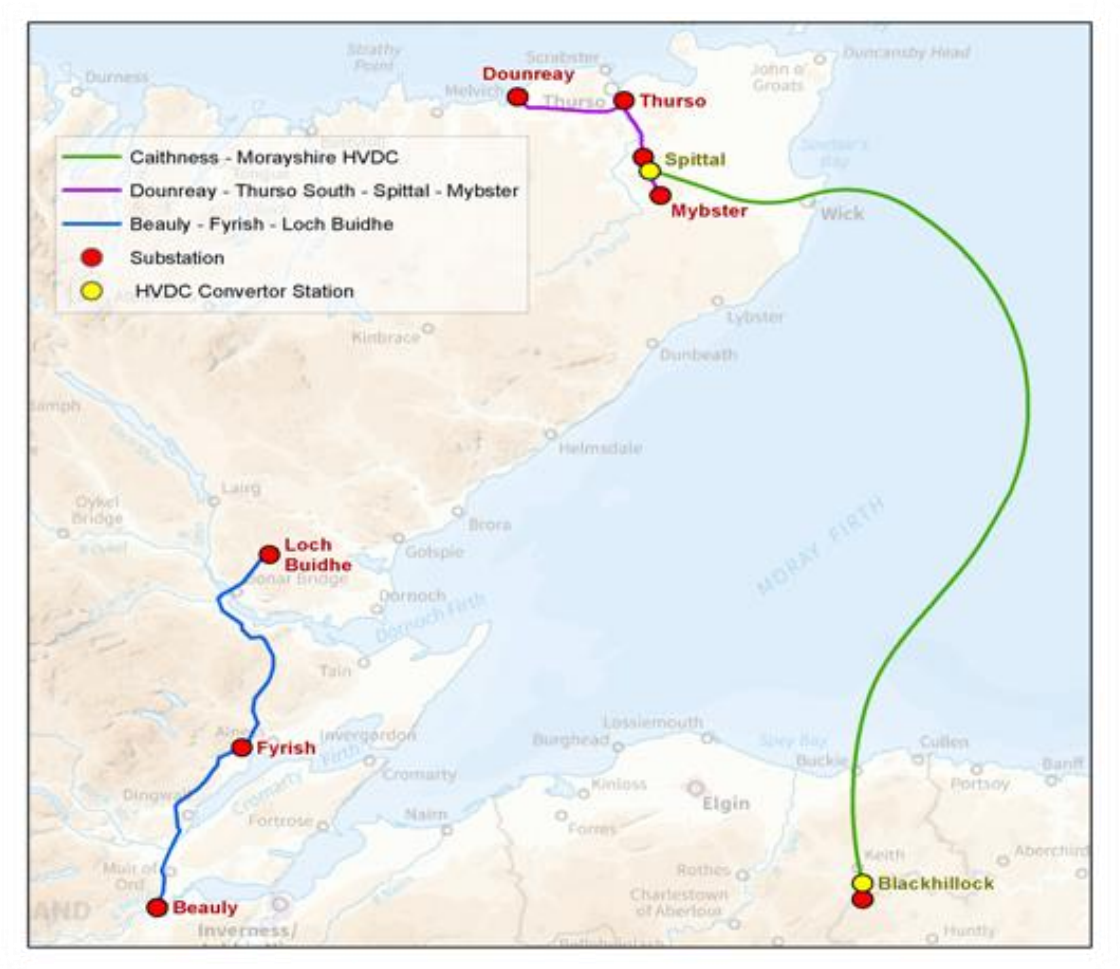
Annex 1: Summary of proposed Caithness Moray subsea cable and other options

SHE Transmission's proposed transmission project is needed to increase the capacity of the transmission system in northern Scotland (specifically to provide additional capacity across transmission system boundaries B0 and B1). The proposed project, Option 1a, is shown in Figure 1.

Figure 1 – Caithness Moray subsea cable and associated onshore works (Option 1a)



The specific works involved in the proposal comprise:

- A new 275/132kV substation at Spittal, approximately 4km north of Mybster.
- Redevelopment of the Blackhillock substation, including a new 400kV busbar.
- A HVDC cable between Spittal and Blackhillock (160km) comprising a 800MW cable from Spittal to the Caithness coast, then a 1,200MW subsea cable to Blackhillock.
- A new 275kV/132kV substation at Loch Buidhe, at the crossing of the Beauly to Dounreay 275kV and Shin to Brora/Mybster 132kV overhead lines.
- A new 275/132kV substation at Fyrish near the existing Alness 132kV Tee point and moving the existing Alness Grid Supply Point (GSP) to the new substation.
- Replacing the existing conductors on the 275kV circuit between Beauly and the proposed new substation at Loch Buidhe (62km).
- Rebuilding the existing Dounreay–Thurso–Spittal 132kV circuits at 275kV (32km) and a new 275/132kV substation at Thurso South close to the existing Thurso GSP.
- A new 132kV double circuit overhead line between the new substation at Spittal to Mybster (4km).
- A new 132/33kV collector for new wind generation around Mybster.

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The proposed subsea cable includes anticipatory investment to accommodate a future cable link from Shetland. The main anticipatory element included in the proposal is additional capacity (400MW) in the cable from the Caithness coast to the Blackhillock substation in Morayshire (c. £60m incremental cost). The proposal does not include the cable link to Shetland.

Table 1 summarises three of the reinforcement options examined in SHE Transmission's cost-benefit analysis. Figure 2 depicts the routing and combination of possible reinforcement options.

There have been a number of changes in the cost of the different options since we last consulted. SHE Transmission has found £32m of savings for its preferred option (£1268m-1236m). The downstream reinforcement's cost's has also decreased by £95m (£447m-352m). Finally, the cost of the onshore option has increased by £62m (£1547-1609m). On the one hand, costs for the onshore option fell because of SHE Transmission's use of its framework costs. But on the other hand, costs rose significantly because of SHE Transmission's more detailed route analysis for the onshore option. There were significant costs added to deliver mitigation works (ie undergrounding of cables, installing bird diverters) which were expected to address areas of sensitivity along the route, and obtain planning consent.

Table 1 – Proposed reinforcement and other possible options

Option	Technology	Capital cost (£m, 2013 prices)	Timing	Additional boundary capability	Shown in figure 2
1a	HVDC subsea cable link between Caithness and Morayshire + onshore works **(SHE Transmission's proposed option)**	1,236	2018	B0: 800MW B1: 850MW	C (see figure 1 also)
1b	1a + downstream reinforcement (onshore rebuild of double circuit line between Beauly and Blackhillock to 400kV)	1,588	2018 and 2024	B0: 800MW B1: 1,720MW	C + B
2b	Onshore rebuild of 132kV double circuit line between Dounreay to Beauly to 275kV + downstream reinforcement	1,609	2026 and 2024	B0: 1,095MW B1: 1,480MW	A + B

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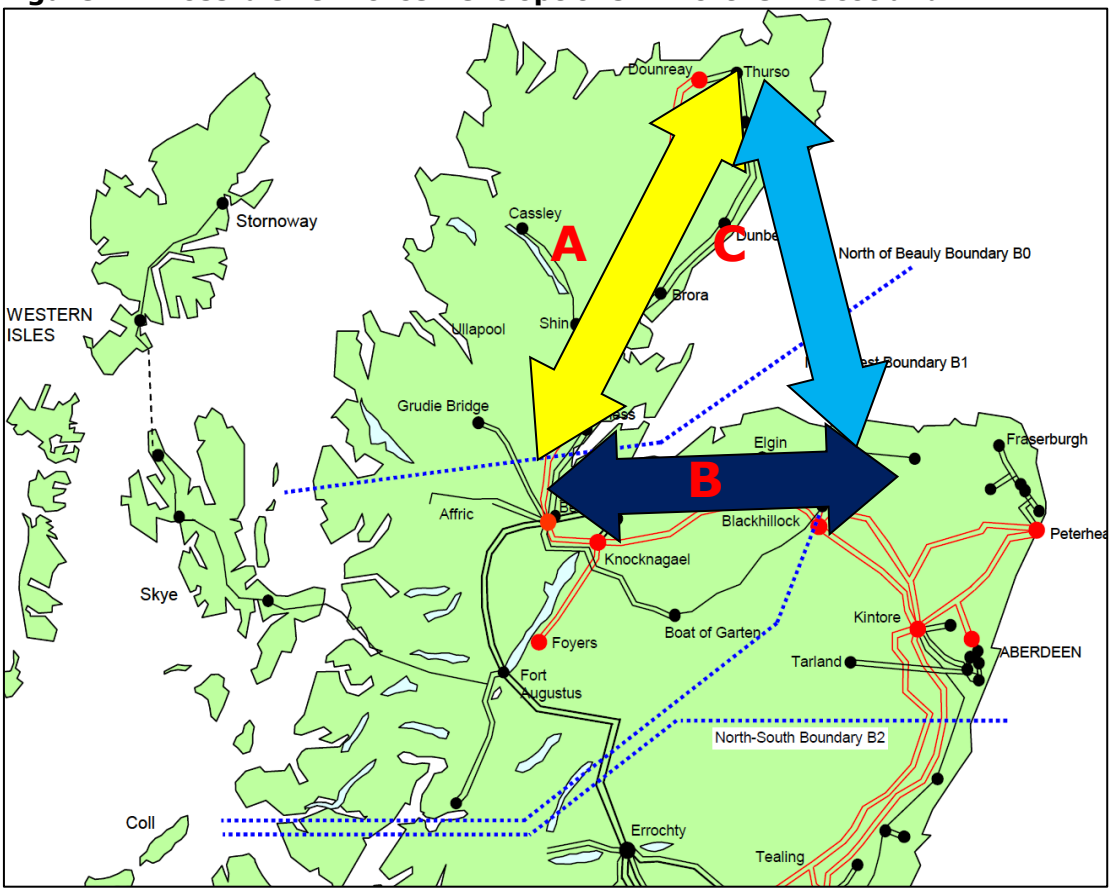
Figure 2 – Possible reinforcement options in northern Scotland



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