

Appendix G - NDP example – Northern England

This example illustrates how the Network Development Policy will provide the best course of action in the current year and shape the long term transmission solutions based on the future transfer requirements on three of the wider boundaries in the Northern England region - B6, B7 and B7a. Geographical representations of the boundaries are shown in the Appendix A1.4.

Identification of Future Transmission Capability Requirements

As discussed in chapter 3, a shortfall in boundary capability compared with Required Transfer indicates a need for reinforcement of that boundary. As generation and demand across the country develop over time, increasing transfers could drive the requirements for more reinforcements. Discussion of the national generation and demand scenarios of each boundary, with the relevant graphs of generation background and capability can be found in chapter 3.

Fan Diagrams

The Cost-Benefit Analysis used in NDP covers year-round transmission conditions. The Fan Diagram figures G.1, G.2 and G.3 below show the variation of the year-round transmission flows across B6 for the Gone Green, Slow Progression and Accelerated Growth scenarios. The single black line in the middle of the diagram represents the mean power transfer in the year. The dark blue shading represents the range of transfers between the 25th-percentile P(25) and 75th-percentile P(75) in the year. Finally, the light blue shading represents the full range of transfers in the year, i.e. P(0) to P(100).

These figures show that the highest year-round transfers are driven by the Gone Green and Accelerated Growth scenarios. The mean transfer under the Slow Progression scenario is significantly lower in 2030 than in 2012, although the range of year-round transfers is significantly greater. The current boundary capability is also shown in the diagram; and that suggests a deficit in boundary capability i.e. future need for reinforcement to the transmission network particularly for Gone Green and the Accelerated Growth scenario.

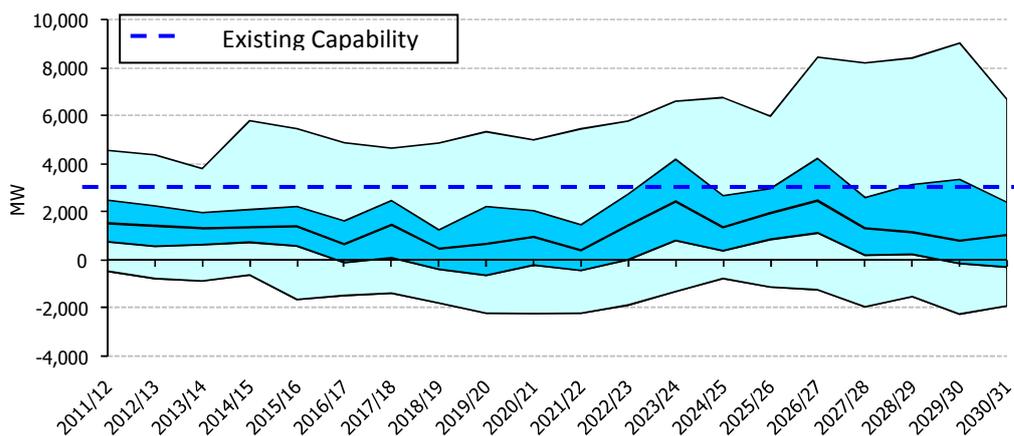


Figure G.1: Fan diagram of year round flows across B6 for the Gone Green scenario

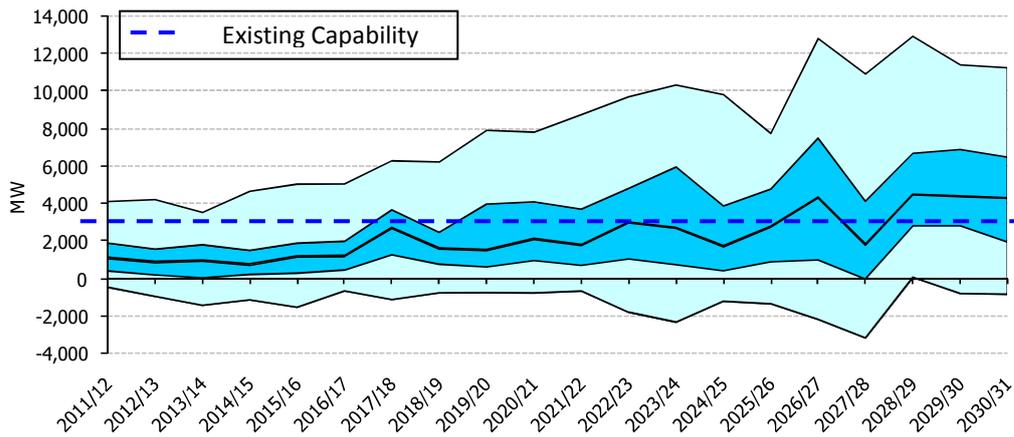


Figure G.2: Fan diagram of year round flows across B6 for the Slow Progression scenario

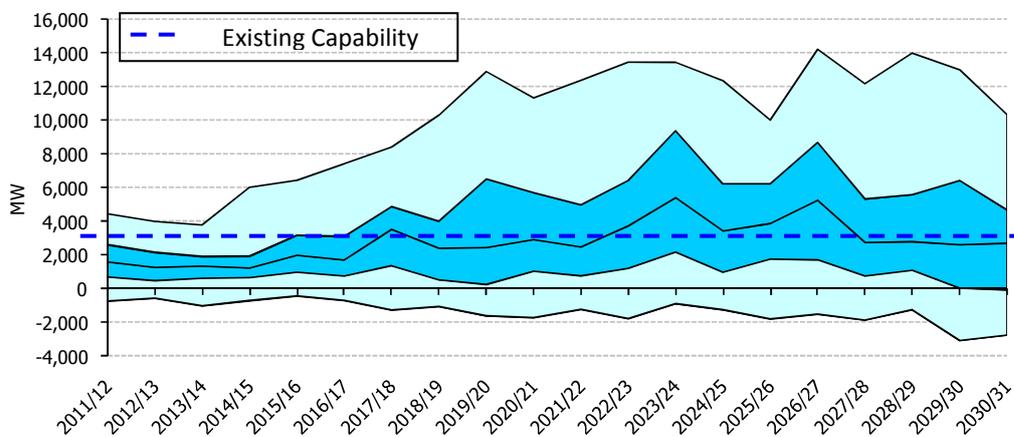


Figure G.3: Fan diagram of year round flows across B6 for the Accelerated Growth scenario

Identification of Transmission Solutions

For Northern England, the following investment options presented in table G.1 are identified to provide a sufficiently wide range of solutions to include both small-scale reinforcements with short lead-times as well as larger-scale alternatives, which are likely to have longer lead-times. The “do-nothing” option will be considered and included in the later stage of this example.

The Anglo-Scottish reactive compensation, Harker-Hutton reconductoring and Penwortham QBs projects are close to completion and therefore have been included in the baseline of the analysis. Significant commitments have also been made to progress the Western HVDC link following extensive engagement with Ofgem as part of the TII process, so this has also been included in the baseline.

Options - Transmission Solutions	Boundary	Lead Time (years)	Pre-construction Cost (% of Total Cost)	Stage of Project
Eastern HVDC Link 1 – Peterhead to Hawthorn Pit	B4, B6, B7, B7a	6	2%	Optioneering
Eastern HVDC Link 2 – Torness to Lackenby	B6, B7, B7a	6	2%	Scoping
Eastern HVDC Link 3 – Peterhead to England	B4, B6, B7, B7a	6	2%	Scoping
Mersey Ring Stage 1	B7a	5	2%	Optioneering
Reconductor Harker-Strathaven & Series Compensation	B6, B7	4	2%	Scoping
Yorkshire Lines Reconductoring	B7, B7a	4	2%	Scoping

Teeside-Humber-Wash Offshore Integration Stage 1	B7, B7a	6	2%	Scoping
Teeside-Humber-Wash Offshore Integration Stage 2	B7, B7a	6	2%	Scoping
Teeside-Humber-Wash Offshore Integration Stage 3	B7, B7a	6	2%	Scoping
Teeside-Humber-Wash Offshore Integration Stage 4	B7, B7a	6	2%	Scoping
Teeside-Humber-Wash Offshore Integration Stage 5	B7, B7a	6	2%	Scoping
Cumbria-North Wales Offshore Integration	B7a	6	2%	Scoping

Table G.1: Potential transmission solutions for Northern England

Selection of Transmission Solution and Timing

Cost benefit analysis was completed with various different strategies (combinations and timings of transmission solutions) until the lowest cost was found for each of the scenarios. The main objective of NDP is to aid the decision on current year options, hence reinforcements with short lead time and required post-2020 are not considered for further analysis.

The lowest cost strategies for Northern England for the Gone Green, Slow Progression and Accelerated Growth scenarios identified are shown in table G.2.

Scenario	Strategy	
	Transmission Solution	Completion Date
Gone Green	Completion of Eastern HVDC Link 1.	2019
	Completion of Mersey Ring Stage 1.	2017
Slow Progression	Do nothing.	-
Accelerated Growth	Completion of Eastern HVDC Link 1.	2018

Table G.2: Lowest cost strategies for Northern England

Development of the Current Year Options

Table G.2 shows that the lowest cost strategies for each of the scenarios are different, and therefore there is a risk of regret. The Eastern Link 1 project can be divided into two elements - pre-construction and construction. This creates the option to complete the lower cost pre-construction element under all scenarios such that the construction phase can proceed to time under the Accelerated Growth scenario; or the project can be terminated with minimal regret under the Slow Progression scenario. The pre-construction element of the Mersey Ring Stage 1 project has already been completed. Due to lead time constraints, a decision on whether to commit to further spend for this project will have to be made to achieve the lowest cost strategy for the Gone Green scenario. The options for the current year are shown in table G.3.

Current Year Options for Northern England	Scope of Options
Option 1	Complete Eastern Link 1 pre-construction.
Option 2	Commit to a further year of spend for Mersey Ring Stage 1 construction.
Option 3	Complete Eastern Link 1 pre-construction; and Commit to a further year of spend for Mersey Ring Stage 1 construction.
Option 4	Do nothing.

Table G.3: Current year options for Northern England

The regret costs for each of the options in table G.3 against each of the scenarios are shown below in table G.4:

Current Year Options for Northern England	Gone Green	Accelerated Growth	Slow Progression	Worst Regret
Option 1	£11m	£0	£12m	£12m
Option 2	£0m	£193m	£15m	£193m
Option 3	£1m	£15m	£27m	£27m
Option 4	£10m	£178m	£0m	£178m

Table G.4: Regret costs for each of the options against Gone Green, Accelerated Growth and Slow Progression. The 'worst' regret costs are highlighted.

Option 1, which includes the completion of Eastern HVDC Link 1 pre-construction, shows the least 'worst' regret cost (highlighted) among all options considered and is therefore selected.

Whilst the Eastern Link pre-construction option represents the best option, if the Accelerated Growth scenario were to be omitted from the analysis then the 'do-nothing' option would become the best option. However, even without the Accelerated Growth scenario, the lead time risks associated with a project as complex as the Eastern Link could cause significant congestion costs against the Gone Green scenario if completion is delayed. This means the completion of the pre-construction work remains the best option.

NDP Outputs – Northern England

The Eastern HVDC Link 1 pre-construction is to be taken forward in 2013/14.