

Appendix 10.1:

Cavan-Tyrone & Meath-Cavan

400 kV Transmission Circuits

Technology and Costs

Update Supplementary Note

(July 2013)



July 2013

CAVAN-TYRONE & MEATH-CAVAN 400 KV TRANSMISSION CIRCUITS

TECHNOLOGY AND COSTS UPDATE

SUPPLEMENTARY NOTE

**PARSONS
BRINCKERHOFF**

Supplementary Note to the Technology and Cost Update Addendum Implications of EirGrid's Decision to Defer Kingscourt Substation

1 INTRODUCTION

1. On 16th April 2013 EirGrid published its North–South 400kV Interconnection Development: Final Re-evaluation Report. In this report EirGrid announced its decision to defer the intermediate substation near Kingscourt. A consequence of the deferment of the substation, regardless of which technology option is chosen, is that it would reduce the initial investment required to develop the N-S Link, so EirGrid has requested Parsons Brinckerhoff to provide an indication of the impact of the deferment on the initial investment.
2. The deferment of Kingscourt would not cause the same reduction in investment for each transmission technology option. We provide below, therefore, references to our April 2013 Comparison of High Voltage Transmission Options [1] (referred to below the Addendum) for each technology option, to determine whether the Kingscourt deferment would alter the conclusions of the comparative costing study. This supplementary note should be read in conjunction with the April 2013 Addendum.

2 REVISED COSTS ESTIMATES

3. The following figures provide a simple overview of the differences in estimated capital costs of each technology, and do not take into account interest during construction, operating costs, or the time value of money (discounted cash flow).
4. Please note that figures in this section are rounded to the nearest €1 million.

Table 2-1 HVAC OHL Costs (base case)

Item	€M	Notes
Total OHL Construction	118	Refer Column 4, Table 8-4, page 20
Switchgear + transformers	41	Refer Table 8-23b, page 37
Original Capital Cost including Kingscourt	159	
Less Switchgear + transformers at Kingscourt	21	Refer Table 8-23b, page 37
Revised Capital Cost excluding Kingscourt	138	

Table 2-2 HVAC UGC Costs

Item	€M	Notes
Total UGC Construction	857	Refer Column 4, Table 8-22, page 31
Switchgear + transformers	46	Refer Table 8-23b, page 37
Original Capital Cost including Kingscourt	903	
Less Switchgear + transformers at Kingscourt	23	Refer Table 8-23b, page 37

¹ Parsons Brinckerhoff's Cavan-Tyrone & Meath-Cavan 400 kV Transmission Circuits – Comparison of High Voltage Transmission Options: Alternating Current Overhead and Underground, and Direct Current Underground – Technology and Costs Update since Publication of the 2009 Report, self-referenced as “the Addendum”.

Revised Capital Cost excluding Kingscourt	880	
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Table 2-3 HVDC UGC Costs

Item	€M	Notes
Total Construction + IDC	953	Refer Column 4, Table 8-23a, page 35
Switchgear + transformers	15	Refer Table 8-23b page 37
Original Capital Cost including Kingscourt	968	
Less AC/DC Converters at Kingscourt	148	Refer Table 8-23 on page 34 - one third of costs of converters
Less Switchgear + transformers at Kingscourt	8	Refer Table 8-23b, page 37
Revised Capital Cost excluding Kingscourt	812	

5. NOTE: It was stated in Section 1.4 of the Addendum that as the aim of the study is to estimate the differences in cost between the transmission circuit technology alternatives, the costs of those elements of the overall project which are common to all options have been intentionally excluded (Refer Paragraph 115, page 36). The above cost estimates should therefore be construed as 'whole of project' cost estimates.

3 SUMMARY OF COST ESTIMATES

6. The summary cost estimates for the initial capital investment required for each option and each scenario are shown in the tables below. The costs are rounded to the nearest €5 million.

Table 3-1 Original scenario, inclusive of Kingscourt Substation

Technology Option	Capital Cost (€ million)	Cost Difference compared to base case (€ million)
AC Overhead Line (base case)	160	N/A
AC Underground Cable	905	745
HVDC Underground Cable	970	810

Table 3-2 Revised scenario, excluding Kingscourt Substation

Technology Option	Capital Cost (€ million)	Cost Difference compared to base case (€ million)
AC Overhead Line (base case)	140	N/A
AC Underground Cable	880	740
HVDC Underground Cable	810	670

7. From the above tables it can be seen that the deferment of the costs associated with the substation near Kingscourt has had little or no impact on the difference in the initial capital investment between the HVAC OHL option (base case) and the HVAC UGC option. The cost difference remains in the region of €740M.

8. The deferment of Kingscourt however has a significant impact on the cost difference between the HVAC OHL option and the HVDC UGC option. With Kingscourt included the cost differential was €810M. Excluding Kingscourt reduces this to €670M.

4 CONCLUSION

9. Regardless of which technology option is chosen, the deferment of the substation near Kingscourt will reduce the initial investment required to develop the N-S Link.
10. The most cost effective technology option, however, remains an AC overhead line, estimated to cost around €140M.
11. With the deferment of Kingscourt, AC underground cable becomes the most costly option, estimated at around €880M, or €740M more than the AC overhead line. The deferment of Kingscourt has little or no impact on the cost differential with the AC overhead line as similar costs are deferred in the case of both options
12. The deferment of the substation near Kingscourt will however have a significant impact on the initial investment required to develop the HVDC option. This is due to the very high cost of HVDC converters, and the fact that, with the deferment, converters would only be required initially at Turleenan and Woodland not Kingscourt. Under this scenario, the HVDC option, at an estimated cost of around €810M, is no longer the most costly option. It is still, however, €670M more costly than the least cost option AC overhead line.
13. The initial investment cost of the HVDC option is reduced, due to the deferment of the substation near Kingscourt, by around €160M (€970M - €810M), whilst the initial investment costs of the two AC options are only reduced by around €20M - €25M. The disparity of the effects on the AC and HVDC options highlights one major disadvantage of the HVDC option for the Ireland N-S Link. This is that, if the N-S Link is developed using HVDC technology, future 'tap-ins' to the circuit for the substation near Kingscourt and/or for some other as yet unknown requirement at some other location along the route, will be many times more expensive than tapping into an AC circuit.