



**NIAUR – UNIT COST REVIEW AS PART OF SUBLOT 1B**  
**REVIEW OF RP5 CAPITAL EXPENDITURE**

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Submitted by:

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## 1. INTRODUCTION

The Northern Ireland Authority for Utility Regulation (NIAUR) engaged a consortium of Cambridge Economic Policy Associates (CEPA), PKF and Sinclair Knight Merz (SKM) to provide advice on various aspects of the Northern Ireland Electricity Transmission & Distribution (NIE) price control review. This report, prepared by SKM, provides a review of the NIE Units cost that were presented as part of the Price Control 5 period (RP5) review.

The terms of reference provided by NIAUR that are addressed in this report are as follows.

a) Review of the unit costs used in the NIE submission

The output of the analysis is to be a report including recommendations of any adjustments to be made

In this report we have:

- reviewed the Unit Costs benchmark paper produced by NIE and submitted as BPQ08 as part of their RP5 submission
- analysed the BPQ submission to confirm that the cost unit cost included in the paper are those used in the submission
- reviewed the appropriateness of the benchmark unit cost
- applied the unit costs to an appropriate range of NIE projects to determine the impact of any difference between the NIE unit costs and benchmarks unit cost on the Capital programme
- undertaken the above analysis for Direct and Total unit cost to determine the Indirect uplift element of the unit costs
- analysed the RP5 submission to determine if any of the costs in the programme should also have been included in the capital programme, and
- provided conclusions on the cost reductions that we consider are appropriate.

## **2. REVIEW OF UNIT COSTS**

The unit cost benchmarking report (BPQ08) was submitted by NIE in response to BPQ request D\_REQ 137 and T\_REQ 128 and sets out their unit costs and a comparison to the Ofgem unit costs used in DPCR5. BPQ08 was prepared by a consultant (the Consultant) appointed by NIE. The Consultant undertook a similar exercise for Ofgem in DPCR5 and the unit cost information used in the benchmarking of NIE is comparable to that used by Ofgem in its assessment of the GB DNO unit costs in DPCR5. SKM are aware of the rigor with which the Consultant prepared the Ofgem unit costs and consider them as valid comparator to the NIE unit costs.

Consistent with the treatment applied by Ofgem, the Consultant undertook the NIE assessment of benchmark unit costs having removed from the analysis corporate overheads. This is as a consequence of the GB DNOs each treating overheads in a different manners and therefore Ofgem benchmarked corporate overheads outside the unit cost review.

In assessing unit costs BPQ08 separates the Total Unit Cost of each installed asset into Direct and Indirect Costs. To allow comparison with the GB DNO assessment, the indirect costs are defined as the element of the unit costs associated with:

- Network design and engineering,
- Project management,
- Engineering management and clerical support; and
- Vehicles and transport

Note that the rates used by NIE when undertaking capex are underpinned by the Powerteam hourly rate. The hourly rate is calculated in order to recover indirect and direct cost elements and therefore includes the costs that Ofgem would have excluded from its unit cost comparisons. To address this NIE presented total costs based on unadjusted Powerteam hourly rate and direct costs using an adjusted hourly rate to exclude indirect costs. It is the direct cost that the NIE consultants used for their like-for-like comparisons. The BPQ08 report does not give insight into how these were apportioned but it is assumed that both the consultant and NIE agreed the apportionment.

### **2.1. Assessment of Direct Unit Costs**

In BPQ08 materials and service costs are based on 2009/10 prices except in the case of transformer costs which have been based on 2010/11 contract prices due to the fluctuations in market prices.

The Consultant's unit cost data was sourced from recent UK projects and industry price books as listed below:

- unit costs and investment appraisal scheme papers as declared by DNOs as part of Regulatory Reporting 2008 (RRP 2008);

- unit costs as declared by DNOs as part of the DPCR5 Forecast Business Plan Questionnaire (FBPQ);
- Spon's Mechanical and Electrical Price Book 2010, for the costs of supply and installation of HV and LV cables and HV/LV distribution substation equipment;
- Spon's Architect and Builders Price Book 2008, for costs of cable trenching and reinstatement;
- cost data obtained from current or recent projects in the United Kingdom engineered by the Consultant;
- Spon's BEAMA and RPI cost indices applied to historic prices held by the Consultant in their unit cost database;
- suppliers' published price lists, including Alcan (overhead line conductor) and Kilgraney (wood poles); and
- Statements of connection charges as published by the DNOs and, to a lesser degree, the TOs.

SKM considers that these data sources are a sound and robust basis for compiling unit cost assessments.

The unit costs include the basic costs of material, supply and installation as would be incurred by a DNO/TNO or paid to a contractor, based on a set of cost-build assumptions, (e.g. ground type, cost of excavation, overhead line type, pole arrangement, etc).

In any comparison of unit costs it is important to make sure that the assessment is being undertaken on a like for like basis. NIE has indicated that the Consultant has worked with NIE to ensure that the unit costs being compared are on the same or similar basis. The Consultant states that, in an appreciable number of instances, the NIE asset categories (and content) differ from those used by Ofgem for DPCR5. In these instances the Consultant has calculated their own estimates in order to make comparisons. In our assessment we have reviewed the OHL Reengineering and Refurbishment costs developed by the consultant and they appear to contain an appropriate level of work content for the tasks to be undertaken.

NIEs report states that in carrying out the comparisons, there were significant differences in categories of expenditure due to equipment types, specification of equipment and works and voltage levels. For instance, for the purposes of the benchmarking exercise NIE's 110 kV costs have been compared with GB 132 kV costs. We believe that this is appropriate.

NIEs unit costs are compared to the published unit cost data at DPCR5 for the GB DNOs in Appendix A of BPQ08. The Consultant concludes NIE unit costs are typically lower than both the Ofgem values and the DNO average values.

As the difference between benchmarked direct cost and NIE direct costs varies by asset category we have analysed the effect on the capex programme by applying both NIE and benchmark direct costs to the a range of projects. The asset categories chosen for this analysis were those which NIE allocate to pot-1 in their proposals for RP5 incentives (BPQ04). They were chosen as the supporting RP5 asset category papers have detailed breakdowns of the volumes of assets requested in RP5.

From Annex A Table A columns (6) and (9) it can be seen that the overall impact of the difference between the NIE direct unit cost and the consultants direct unit costs is that NIEs direct unit costs are on 75% of the benchmarked unit costs.

We note however that no allowance has been made in the unit price assessment for regional price adjustments. CEPA have investigated regional price adjustments as part of the efficiency benchmarking work for RP5 and note that Northern Ireland have wages approximately 10% lower than the GB average. This would account for some of the difference, however given that this only applies to the labour elements then overall direct costs would be still be approximately 20% less than the GB average (work content differences notwithstanding).

It should be noted that the GB DNO cost varied considerably from the mean on a category by category basis due to different work content in each DNO's price build. NIE's consultant has reviewed the NIE work content against unit costs and provided assessments on where the content differs. We agree with the consultant's conclusions that even given differing content NIEs direct costs are generally lower than the GB averages however we would caution that the calculated figure of 20% probably overstates the level of out-performance even though it is based on NIEs figures.

## **2.2. Assessment of Indirect Costs**

For GB DNOs Ofgem stipulated that indirect costs associated with network extensions, reinforcement, refurbishment or replacement comprised:

- Network design and engineering,
- Project management,
- Engineering management and clerical support; and
- Vehicles and transport

Other business indirect costs (such as corporate charges, HR & finance) were excluded from the unit cost indirect charge element and were treated and assessed separately.

The Consultant's unit cost analysis uplifts the GB DNO direct costs in order to allocate indirect costs. The uplift is 17% for distribution assets, 7.5% for transmission substation plant assets and 10% for transmission overhead line assets.

The 17% uplift applied to distribution assets is a reasonable uplift as it corresponds to the average indirect uplift submitted by the DNOs for the DPCR5 period and is derived from their Final Business Plan Questionnaire (FBPQ) submissions. The lower uplift applied to Transmission assets reflects the higher material costs of the assets. We consider this appropriate.

The NIE capital indirect costs (the difference between the Direct and Total Costs presented in BPQ08) vary between zero and 50% of the direct costs. Again in Table A of Annex A we have applied the NIE costs to the "Pot-1" projects to determine the overall indirect uplift on the programme.

It can be seen from column 8 that the overall indirect cost applied to the capital replacement programme amounts to a 32% uplift on the direct cost. This is significantly more than the 16% GB average (impact of 17% Distribution and 7.5-10% for Transmission) and this would be compounded more by the impact of the 10% labour cost reduction to account for regional wage differences.

However as the NIE direct costs are 25% lower than the Consultants benchmark Direct Costs, NIE Total Costs are indicated to be 15% lower than the Consultant's total benchmark' costs for the "Pot 1" projects reviewed.

For the projects included in our assessment:

- NIE's total cost is £135,873k
- the Consultant's cost is £158,664k, giving
- a difference of £22,791k.

However we also note that in NIEs RP5 submission they include separate projects for Design and Consultancy and Capitalised overheads for both Transmission and Distribution. Clearly Design and Consultancy costs are part of the definition of Indirects used by Ofgem in the unit cost benchmarking. Also Capitalised Overheads will include elements that are included in the same definition for example:

- Technical Engineers,
- Design and Quotation,
- Planning,
- Programme management,
- Capital Projects,
- Business Support and Administration.

We would therefore classify these project, or elements of them to be "Indirect cost projects". Table 2-1 below shows the value of NIEs Indirect projects in their proposed RP5 capital programme and our estimate of the proportion of the costs that should be added to the NIE total cost assessment in Table A of Annex A to obtain a true like for like comparison of costs.

■ **Table 2-1 Assessment of "Indirect Projects"**

NIE Capex Project		Total Project Cost £k	SKM allocation as Indirect £k	Element to be applied to assessed volumes in Table A
D 12	Distribution Overhead Lines Fixed Costs	£18,064	£18,064	100%
D 20	Distribution Design & Consultancy	£6,676	£2,174	ratio of assessed costs to total distribution
D 45	Distribution Capitalised Overheads	£23,568	£7,607	80% of ratio of assessed costs to total distribution
T 23	Transmission Design and Consultancy	£5,339	£2,669	50%
T 41	Transmission Capitalised Overheads	£3,627	£275	80% of ratio of assessed costs to total Transmission forecast
		<b>£53,647</b>	<b>£30,515</b>	

With these additional indirect projects included in the assessment increases the NIE total cost for the assessed projects increases to £166,388k compared to the consultant's total costs of £158,664k.

This provides the conclusion that for the assessed projects the total unit costs of NIE are 5% higher than GB average benchmarks when the “Indirect cost projects” are included.

When we take into account the fact that the Direct cost elements was less than the GB average, this would indicate a total indirect uplift on the NIE Direct costs of 61% which is considerably more than the GB average of 17%.

Again this is caveated as the direct costs outperformance is probably less than the calculated 20% due to differences in scope.

To assess the potential range of Indirect Costs in excess of the benchmark values we have compared the total benchmarked Indirect cost in Table A of Annex A against a conservative view that the direct cost out performance may be between zero and 50% of that calculated from NIEs own figures.

The assessment is shown in Table 2-2

■ **Table 2-2 Assessment of Indirect Cost reduction requirements**

		Cost £k	
	NIE Total Cost (Inc Indirect Projects)	166,388	(1)
Consultant Cost Benchmark (Total Pot 1)	Total Cost Benchmark	158,664	(2)
	Direct Cost Benchmark	137,277	(3)
	Indirect Cost Benchmark	21,387	(2)-(3) = (4)
Direct cost out performance at 50% (Total Pot 1)	NE Direct Cost 50% out performance	120,200	(5)
	Indirect Cost	46,188	(1)-(5) = (6)
	% reduction required to meet benchmark	54%	((6)-(4))/(6)
Direct cost out performance at 0% (Total Pot 1)	NE Direct Cost 0% out performance	137,277	(7)
	Indirect Cost	29,111	(1)-(7) = (8)
	% reduction required to meet benchmark	27%	((8)-(4))/(8)

It can be seen that NIE indirects associated with the capex programme would need to reduce by between 27% and 54% to meet the benchmark values.

**2.3. Use of NIE Unit costs in the NIE RP5 Capex submission.**

In Annex A -Table B we present an analysis of the unit volumes and RP5 capital costs presented by NIE in their BPQ submission. We have applied the NIE unit cost to these volumes and identified the reasons for any variance between this derived cost and the total cost submitted by NIE. In summary:

- The total unit costs have been applied at the 2009/10 price levels as indicated within BPQ08; and
- Any variations are principally due to TAR and vegetation management costs not being included within BPQ08 unit cost assessments.
- We are satisfied that the NIE Total Unit Costs presented in the BPQ08 are the basis of the NIE BPQ submission.



### 3. OVERALL CONCLUSIONS

The unit cost benchmarking undertaken by NIEs Consultants on their behalf and presented as paper BPQ08 is comprehensive and based on a reasonable data set of unit costs that are consistent with the Ofgem benchmarking undertaken as part of DPCR5.

We have confirmed that these unit costs have been used in the NIE RP5 Capex plan that has been submitted.

The NIE Direct Unit Costs are generally lower than the consultant's benchmark costs. This varies by asset type and when we applied the cost to the Pot 1 project to determine an overall impact of the difference the NIE costs were 25% lower than benchmark. With the effect of regional price adjustments this would reduce to 20%. Some caution needs to be applied to these figures as the technical content of the units differs between NIE and the benchmarks and we would agree with NIEs consultants that they have demonstrated that the direct costs are lower but we would say that the degree of outperformance is up to 20%.

When the NIE capital indirect costs were assessed in a similar manner using comparison of the direct costs to the NIE Total Cost and the consultants benchmark total unit costs. The NIE indirect costs were found to be 32% compared to the Consultants 17% but due to the lower direct costs the NIE Total Costs were still less than the Benchmark total costs. However the NIE RP5 programme includes a number of projects that would be covered under the tasks identified as Indirect costs in the benchmarking exercise. This changes the assessment significantly with the NIE total cost exceeding benchmark by 5%.

Given that there is a possible range of direct cost outperformance, we considered conservative estimates that the direct cost out performance may be between zero and 50% of that calculated from NIEs own figures. From this assessment we determined that NIE indirects associated with the capex programme would need to reduce by between 27% and 54% to meet the benchmark values.

# ANNEX A – UNIT COST REVIEW

## Table A - SKM Comparison of NIE & the Consultant's Unit Costs

Asset categories		NIE Quantities		Total Unit Costs			Direct Unit Costs			NIE Overall Indirect Uplift			Cons Overall Indirect Uplift			
		Units	1	2	3	Comparison of total unit costs NIE/PB (2)/(3) From BPQ08	4	5	Comparison of direct unit costs NIE/Cons (4)/(5) from BPQ08	6 =(1 X 4)	7 =(1 X 2)	8 = (7 / 8)	9 =(1 X 5)	10 =(1 X 3)	11 =(10 / 9)	
		No of Units	Paper No & Page No	(£k)	(£k)		(£k)	(£k)		NIE Directs Cost	NIE Total Cost	NIE Derived Uplift	Cons Directs Cost	Cons Total Cost	Cons Derived Uplift	
Secondary Substations	11-6.6kV RMU Replacement	Each	60	C8 P4	9.8	16.7	59%	8.9	14.3	62%	534.0	588.0	1.10	858.0	1002.0	1.17
	4-Pole Structure (replaced by ESI package)	Each	190	C11 P4	28.1	27.2	103%	25.4	23.3	109%	4826.0	5339.0	1.11	4427.0	5168.0	1.17
	2-Pole Structure	Each	110	C10 P3	15.7	19.0	82.3%	13.7	16.3	84.2%	1507.0	1727.0	1.15	1793.0	2090.0	1.17
	11-6.6kV Distribution Substation inc. Temporary	Each	70	C8 p4	43.0	62.5	69%	39.6	53.4	74%	2772.0	3010.0	1.09	3738.0	4375.0	1.17
	11-6.6kV Distribution Substation	Each	380	C8 p4	32.8	46.8	70%	30.1	40.0	75%	11438.0	12464.0	1.09	15200.0	17784.0	1.17
	Cable Feed GM Transformer	Each	60	C9 P2	23.3	29.2	80%	21.0	25.0	84%	1260.0	1398.0	1.11	1500.0	1752.0	1.17
	4 way Mini-pillar	Each	1170	C13 P5	3.7	4.0	92%	3.2	3.4	94%	3744.0	4329.0	1.16	3978.0	4680.0	1.18
275kV Overhead Line Asset Replacement	Suspension Insulators	Tower side (circuit)	556	D1 P4	3.9	3.1	127%	3.0	2.8	107%	1668.0	2168.4	1.30	1556.8	1723.6	1.11
	Tension Insulators	Tower side (circuit)	130	D1 P4	14.8	13.8	107%	11.9	12.5	95%	1547.0	1924.0	1.24	1625.0	1794.0	1.10
	Spacers	Span	686	D1 P4	1.2	1.4	83%	0.9	1.3	69%	617.4	823.2	1.33	891.8	960.4	1.08
	Tower Painting	Tower	297	D1 P4	10.0	10.6	95%	10.0	9.6	104%	2970.0	2970.0	1.00	2851.2	3148.2	1.10
	Colour & Number Plates	Tower	343	D1 P4	0.8	0.9	93%	0.6	0.8	72%	205.8	274.4	1.33	274.4	308.7	1.13
	Foundation Assessment	Tower	343	D1 P4	0.6	0.6	100%	0.6	0.5	110%	205.8	205.8	1.00	171.5	205.8	1.20
	Condition Assessment	Tower	594	D1 P4	0.6	0.7	98%	0.4	0.6	60%	237.6	356.4	1.50	356.4	415.8	1.17
110kV Overhead Line Asset Replacement	Conductor	Span	55	D1 P4	11.5	13.2	87%	8.0	12.0	67%	440.0	632.5	1.44	660.0	726.0	1.10
	Suspension Insulators	Tower side (circuit)	324	D1 P4	2.0	2.1	92%	1.5	2.0	78%	486.0	648.0	1.33	648.0	680.4	1.05
	Tension Dampers	Tower side (circuit)	102	D1 P4	0.6	0.8	83%	0.4	0.7	59%	40.8	61.2	1.50	71.4	81.6	1.14
	Tension Insulators	Tower side (circuit)	56	D1 P4	5.7	5.9	97%	4.5	5.4	84%	252.0	319.2	1.27	302.4	330.4	1.09
	Tower Painting	Tower	445	D1 P4	5.3	5.3	99%	5.3	4.8	109%	2358.5	2358.5	1.00	2136.0	2358.5	1.10
	Pole Replacement	Pole set	800	D1 P4	4.0	6.3	64%	2.8	5.7	50%	2240.0	3200.0	1.43	4560.0	5040.0	1.11
	Colour & No Plates	Tower	426	D1 P4	0.6	1.3	48%	0.4	1.2	37%	170.4	255.6	1.50	511.2	553.8	1.08
33kV Overhead Lines	Foundation Assessment	Tower	890	D1 P4	0.6	0.6	100%	0.6	0.5	110%	534.0	534.0	1.00	445.0	534.0	1.20
	Condition Assessment	Tower	890	D1 P4	0.3	0.3	98%	0.2	0.3	60%	178.0	267.0	1.50	267.0	267.0	1.00
	Re-engineer - rebuild main/Refurb spur	km	297	D3 P4	18.9	17.2	110%	13.8	14.7	92%	4098.6	5613.3	1.37	4365.9	5108.4	1.17
	Basic Refurb	km	738	D3 P4	4.7	5.7	83%	3.4	4.9	71%	2509.2	3468.6	1.38	3616.2	4206.6	1.16
	Re-engineer - rebuild main/Refurb spur	km	1986	D3 P4	16.9	16.6	102%	11.4	14.2	81%	22640.4	33563.4	1.48	28201.2	32967.6	1.17
	Basic Refurb	km	4949	D3 P4	4.2	4.0	107%	2.9	3.4	84%	14352.1	20785.8	1.45	16826.6	19796.0	1.18
	LV Refurb - pole replacement	km	1600	D4 P7	6.9	14.3	48%	4.5	12.3	37%	7200.0	11040.0	1.53	19680.0	22880.0	1.16
LV Lines	Underground - direct access	km cable	5	D4 P7	114.2	229.6	50%	101.2	196.2	52%	506.0	571.0	1.13	981.0	1148.0	1.17
	Underground - land locked	km cable	10	D4 P7	169.8	169.8		150.4	150.4		1504.0	1698.0	1.13	1504.0	1698.0	1.13
	Undereaves	Property	16000	D5 P6	0.7	0.8	86%	0.5	0.7	66%	8000.0	11200.0	1.40	11200.0	12800.0	1.14
LV Cut-outs	Cutouts - Simple	Property	7200	D6 P3	0.2	0.2	87%	0.2	0.2	97%	1440.0	1440.0	1.00	1440.0	1440.0	1.00
	Cutouts - Complex	Property	800	D6 P3	0.8	0.8		0.8	0.8		640.0	640.0	1.00	640.0	640.0	1.00
<b>Totals</b>										103122.6	135873.3	1.32	137277.0	158663.8	1.16	

**Table B - Reconciliation of Pot 1 Projects costs with Unit Costs presented in BPQ08**

	Pot 1 Total £k	NIE Total Pot 1 Unit Cost X Identified volumes £k	Variation £k	Reason for variation	NIE RP5 Papers
	1	2	(1 - 2)		
<b>Distribution</b>					
33kV Overhead Lines	£11,552.03	£ 9,081.90	£ 2,470.13	TAR not included in PB unit cost analysis (£2,462k in D3)	D3
11kV Overhead Lines	£68,260.25	£ 54,349.20	£13,911.05	TAR not included in PB unit cost analysis (£13,684k in D3)	D3
LV Lines	£19,142.66	£ 13,309.00	£ 5,833.66	TAR not included in PB unit cost analysis (£5.67k in D4). NIE have used £ 8.4 per km in D4 for refurb costs instead of £6.9 in benchmark report	D4
Undereaves	£11,919.78	£ 11,200.00	£ 719.78	Differences due to roundings. D5 uses £745 unit cost whereas pb benchmark report rounds down to £700	D5
LV Cut-outs	£1,832.00	£ 2,080.00	-£ 248.00	Differences due to roundings. D6 uses £165 for simple cut outs and £800 for complex whereas pb unit report uses £200 for simple cut outs	D6
Secondary Substations	£31,855.63	£ 28,855.00	£ 3,000.63	NIE allocation of costs not totally transparent especially where papers deal with both primary and secondary. Additionally, £1,200k inspect and refurb C13 P5 not included in pb benchmark analysis.	B1, B2, B5, B6, C8, C9, C10, C11, C13
<b>Transmission</b>					
275kV Overhead Line Asset Replacement	£8,971.41	£ 8,722.20	£ 249.21	Difference is due to vegetation management of £250k not included in PB benchmark costs but included in D1.	D1
110kV Overhead Line Asset Replacement	£9,421.47	£ 8,276.00	£ 1,145.47	Difference is principally due to vegetation management costs in D1 of £1.24m	D1
<b>Totals</b>	<b>£162,955.22</b>	<b>£135,873.30</b>	<b>£27,081.92</b>		

**Comments**

Principal reasons for variations are:

- TAR costs not being included within the PB unit cost analysis within BPQ08
- Vegetation Management costs not included within BPQ08
- Inspection & Refurbishment costs not included within BPQ08

**Source Data**

Pot 1 Projects source files: Distribution Projects (080611) Pots.xls Transmission Projects (080611) Pots.xls  
Unit Costs source file: BPQ08