Competition Commission – Northern Ireland Electricity

Final Report

Final Report V4.0

Submitted to:
Competition Commission

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Glossary of Terms and Abbreviations

Abbreviation	Full Description
BPI	British Power International
CC	Competition Commission
DNO	Distribution Network Operator
NIE	Northern Ireland Electricity
SKM	Sinclair Knight Mertz (Consultants)
UR	Northern Ireland Utility Regulator
OHL	Overhead Line
RP5	Regulatory Period 5 (Price Control Period)
CEPA	Cambridge Economic Policy Associates
RoI	Republic of Ireland

1. Executive Summary

The Competition Commission (CC) has engaged British Power International (BPI) to carry out a review of the Northern Ireland Electricity Limited (NIE) Capital Expenditure Programme for the Regulatory Period 5 (RP5) which covers 2013 to 2017.

BPI has undertaken a critical review of the projects within the core funding for asset replacement and for load growth management. This final report presents BPI's findings and view on the NIE Capital Expenditure Programme.

NIE is faced with an increasing asset replacement requirement as much of the network which was installed in the 1960's and 1970's is coming to the end of its useful life. This is a similar situation to the one faced by distribution companies in Great Britain. It is therefore not unexpected to see that that RP5 capital allowance is higher than RP4 as BPI have seen similar increases in GB companies.

The outcome of our review recommends that there should be an upward adjustment to the Final Determination by UR for additional projects or increased scope of projects in RP5 in the order of £58 million. In making our recommendation we have reviewed each project solely on its own merits and have not taken into account any limitations on resourcing, procurement, suppliers, network interruptions and other factors that could place constraints on the achievability of this capital expenditure programme.

We believe that the programme of recommended capital projects for NIE is necessary to maintain security of supply and meet customer standards whilst undertaking important network development.

Notwithstanding the above, the recommended programme represents a considerable challenge in terms of achievability as the increase in annual run rate of capital expenditure inferred by this programme of work is well above NIE's current and forecast level of activity and could be subject to a number of potential constraints.

The main areas where BPI has recommended an increase above the Final Determination are:

- We have recommended an increase in the Transmission and Distribution Network Plant projects to replace additional transformers, sub-stations, reactors and other items within the period based on NIE's engineering judgement and risk scoring as well as taking lifetime modelling into consideration. We have also noted that NIE could improve their condition monitoring capabilities and funds are provided for this within the programme.
- We have recommended that the full scope of the Overhead Line projects are undertaken but have agreed to an efficiency reduction in costs within tree cutting operations.
- We have not recommended that the major 11kV OHL replacement programme be carried out as we have assumed that critical areas of the network will be addressed as part of the overall Overhead Line projects.

- The new regulations for Electricity, Safety, Quality and Continuity Regulations (ESQCR) do impose new requirements on NIE and we have made allowance for additional patrolling and surveys as well as supporting information systems. This will enable a well-defined programme of work to be defined now and addressed in RP6.
- There are also a number of areas where we have also made adjustments to the project allowances based on our engineering experience and evaluation of the information provided.

The projects have also been categorised in terms of necessity and timeliness and view on the impact of lifetime costs has been taken into account.

2. Introduction

British Power International (BPI) has been engaged by the Competition Commission (CC) has engaged to carry out a review of Northern Ireland Electricity (NIE) Capital Expenditure Programme for the price control period of 2013 and 2017.

This Draft Final Report presents BPI's findings and view on the parts of NIE Capital Expenditure Programme which are under review within Fund 1 and Fund 2.

The Capital Expenditure (Capex) element of the RP5 determination process started in January 2011 when NIE submitted its response to the Business Plan Questionnaire (BPQ) which laid out its capital expenditure requirements for RP5. The response was supported by Appendices and a number of Strategy Papers which provided the detailed explanation and cost summaries for individual components and projects. NIE also appointed Parsons Brinkerhoff (PB) and Frontier Economics to assess and benchmark unit costs and undertake further analysis.

The Utility Regulator (UR) responded with a Draft Determination which was followed after much discussion and analysis with the submission of a revised Request by NIE. The Final Determination was published by UR in October 2012. There was clearly a gap between the NIE Request and the Final Determination (FD) and the Final Determination was subsequently rejected by NIE and the case referred to the Competition Commission (CC).

BPI was appointed in mid-June 2013 with the remit to undertake a critical review of the NIE proposed capital expenditure programme.

During the review and assessment period, UR appointed Sinclair Knight Merz (SKM) in conjunction with Cambridge Economic Policy Associates (CEPA) to undertake a review of the Capex requirements and other aspects. SKM/CERA used Ofgem GB Utility Regulators Transmission and Distribution Databases that contain benchmarked unit direct costs for project components and asset lifetime analysis to predict replacement periods. This formed the basis for a number of the Final Determination results.

BPI have taken a 2011 perspective of the Capex requirements i.e. we have assessed the projects based on the costs over a full RP5 period rather than the reduced time period that has now become RP5. We have also maintained all costs in their 2009/2010 values and not tried to apply RPI for inflation effects or other variations on the figures used.

Since the last version of this report there have also been two face to face meetings with all parties. This provided NIE and UR an opportunity to set out their view on key areas of difference and for BPI to seek clarification on a number of aspects of the report.

3. BPI Scope of Work

Scope of Work

UR has referred its price control determination (RP5) for NIE to the CC in part because NIE considers that the determination does not allow it to make sufficient capital investment over the next five years to provide an appropriate service to customers and because the Utility Regulator has made insufficient allowance for certain aspects of operating expenditure.

As part of its investigation, the CC has engaged BPI to critically review NIE's proposed capital investment programme over the period with regard to areas that are in dispute.

In particular, the CC wishes to identify which projects and planned volumes of work fall into the following categories in Table 1 below.

Table 1
Project Categorisation

Category	Description
A	The projects, and planned volumes of work which need to be undertaken **before** 1 October 2017 in order to maintain services to customers, comply with applicable network design and planning standards and/or meet any other obligations
B	The projects and planned volumes of work which, whilst not necessary to maintain services to customers, comply with applicable network design and planning standards and/or meet any other obligations, have been included in NIE's business plan for the period to 1 October 2017 with sufficient justification.
C	Any projects or volumes of work within (B) that any reasonable electricity transmission/distribution company would undertake before 1 October 2017 because deferring or cancelling them would increase whole life costs.

We have included a Category D for projects which are deemed to be not necessary at this point.

The analysis of projects by category is shown in Section 8 Conclusions.

In addition, the CC requested that BPI:

- identify the extent to which any of the costs relating to the work above are due to excessively demanding or over-specified network design and planning standards; and
- review the unit cost forecasts that underpin NIE's planned projects and volumes of work.

Approach

BPI has reviewed the requested projects submitted for NIE Transmission and Distribution Capital Expenditure and the supporting documents, data base and spreadsheets. We have reviewed in detail those projects where there was a difference of over £500,000 between

the NIE Request and the UR Final Determination. We have also looked at some of the projects which have been approved in full by way of comparison. Following an individual assessment of each project we have undertaken a peer review challenge of findings and a view across all the projects to check that the scope of each project is not duplicated elsewhere.

For each project assessment we looked at the supporting evidence and in particular for well-defined scope, justification and clear implications for rejection. We looked at each project from an engineering perspective on a project-by-project basis.

We have used our judgement based on the information provided to make an evaluation and recommendation. It has not been possible to obtain a bottom up detailed cost breakdown of each project for comparison purposes as these details are not available in the spreadsheets or database.

BPI was not asked to carry out a formal benchmark exercise and so our review focussed on the areas of material differences. However, we have made some broad comparisons with the out-turn costs of similar projects for which we have data to ensure that the NIE proposals appear reasonable.

We believe we have looked at each case fairly and brought to bear many years of experience within the electricity supply business within our team.

4. Summary of Final Determination

Both NIE and UR have undertaken a rigorous and detailed analysis of the projects and overall Capex requirements and at the position of referral to the CC Capital Expenditure Programmes stood as below in Table 2 for the areas within BPI Scope:

Table 2
Differences between NIE Final Request and UR Final Determinations
All values are in £m in 2009/2010

	NIE Request	UR FD	Difference NIE to UR
	£m	£m	£m
Part A Core Capex			
Transmission			
Asset replacement	87.1	74.8	-12.3
Load related	37.9	26.2	-11.7
sub-total	**125.0**	**101.0**	**-24.0**
Distribution			
Asset replacement	229.5	187.8	-41.7
Load related	24.6	19.6	-5.0
sub-total	**254.1**	**207.5**	**-46.6**
Legislation	29.4	5.7	-23.8
Customer Priorities	12.5	1.8	-10.8
Overheads	57.3	15.7	-41.6
Network IT	3.7	3.7	0.0
Smart Grid	9.4	0.0	-9.4
Fund 3 Projects	43.4	43.4	0.0
11kV Network Resilience	35.0	0.0	-35.0
	190.7	**70.2**	**-120.5**
RPEs	37.5	0.6	
Total Part A	**607.3**	**379.3**	**-228.0**
Part B Other Capex			
Connections	37.3	37.3	0.0
Metering	27.5	10.5	-17.0
Keypad metering	10.0	10.0	0.0
Non-network capex	15.2	7.6	-7.6
Network Management system (Upgrade)	2.1	0.0	-2.1
Total Part B	**92.0**	**65.4**	**-26.6**
TOTAL PARTS A & B	**699.3**	**444.7**	**-254.6**

Source: CC spreadsheet "Differences Summary".

The reasons for the difference between NIE's Request and the Final Determination fall into three key categories:

- The need and scope of the project – difference of opinion on justification, assumptions and benchmarking asset life for replacement forecasts.
- Project required but timing may not be confirmed.
- Project costs relating to benchmarking of unit costs both direct and indirect and efficiency factors.

All three factors may apply to any one project as costs may be adjusted and the timing spread over two or more periods.

During this process both NIE and UR have undertaken much detailed analysis and have used consultants to contribute, particularly on unit costs and benchmarking. SKM, in conjunction with CEPA, have conducted comparisons using unit costs and lifetime analysis. By combining these elements the scope and cost of a project can be compared based on predicted replacement timing and costs of project items. SKM reviewed 10 projects in detail and compared the NIE scope to predicted scope and cost. The outcome of this review was included in the Final Determination for those projects and similar principles were applied by UR elsewhere.

Direct unit costs for items such as secondary substations items have been compared between NIE and the SKM model and have been benchmarked with GB DNOs. SKM concluded that NIE's direct unit costs are generally comparable, or better than the benchmark costs used.

NIE have used their own consultants, Parsons Brinkerhoff (PB) and Frontier Economics to undertake cost benchmarking of Project Unit Costs, Tree-cutting and Distribution Overhead Line Refurbishment Expenditure. The results of the NIE benchmarking conclude that NIE unit costs are lower than the benchmark costs on the majority of the categories and the remainder, which are higher than the benchmark, have reasonable justification based on condition, location and unique differences.

SKM has adjusted its forecasting model to reflect the NIE unit costs where possible and the age profile of NIE equipment. Notwithstanding, there are still significant differences in the SKM view on projects which have become the Final Determination and NIE's view. These may be due to:

- Lifetime prediction for asset replacement;
- Load forecasts and assumptions
- Necessity and timing
- Efficiency

In the next section we summarise our views on these key points.

5. BPI's Approach and Assumptions

BPI has not carried out an investigation to the same depth and detail as that carried out by SKM. Rather, BPI has undertaken a desk top review of those high cost projects which have either been agreed but with disputed costs or rejected completely. The key elements and principles we have applied are covered in the points below. BPI has also reviewed a number of the high value projects that have been approved or allocated in full.

Unit Costs

Given that a major part of the differences between the two parties are associated with unit costs, we have summarised our assessment here. Both parties and their respective consultants have used some form of unit costing based on benchmarked costs. The consultants for NIE (Parsons Brinkerhoff and Frontier Economics) and for UR (Sinclair Knight Merz and Cambridge Policy Associates Ltd) have both based their benchmarking on data gathered from GB DNOs during the Distribution Price Control Review 5 (DPCR 5) and the Transmission Investment Review. We have examined the evidence provided along with our own information on costs within the GB DNOs and have formed an opinion on the suitability of the costs used.

Both UR's consultant and NIE's consultant consider that the unit cost information used by Ofgem is a valid comparator to the NIE unit costs. We also agree with that view.

It is important that the costs are compared on a like-for-like basis and to understand what elements of cost are included in the unit costs being compared; this particularly applies to the treatment of indirect costs.

The GB DNO information from DPCR 5 provides the prime data for the benchmarking analysis. Ofgem distinguishes between direct and indirect activities on the basis that direct costs are those activities which involve physical activity with system assets and indirect activities as those activities which on their own could not be classed as a direct network activity.

Ofgem provides useful definitions for Indirect Activities[1], Indirect Costs, Closely Associated Indirect and Business Support Costs. These definitions are reproduced below.

Indirect Activities and Indirect Costs

Ofgem defines indirect costs as those costs associated with conducting Indirect Activities as shown in table 4 below. These Indirect Activities in most cases support work being physically carried out on network assets, and could not, on their own, be classed as a direct network activity. It is generally the case that indirect activities normally do not involve physical contact with system assets, whereas direct activities do.

Of Indirect costs Ofgem distinguishes between Closely Associated Indirect Costs and Business Support costs which are not linked to direct activity.

[1] Ofgem, Electricity Distribution (DPCR5): Glossary of Terms – Regulatory Instructions and Guidance Ref 36d/12, March 2102

Table 4 - Ofgem Definition and Categorisation of Indirect Activities

Indirect Activity	Cost Category
Project Management	Closely Associated
Network Design & Engineering	Closely Associated
Engineering Management & Clerical Support	Closely Associated
Control Centre	Closely Associated
System Mapping	Closely Associated
Call Centre	Closely Associated
Stores, Vehicles & Transport	Closely Associated
Operational Training	Closely Associated
Network Policy	Business Support
Property Management	Business Support
IT & Telecoms	Business Support
HR & Non-operational Training	Business Support
Finance and Regulation	Business Support
CEO and HQ etc.	Business Support

The PB Unit Cost Report sets out the analysis undertaken by PB. The Report states that PB worked with NIE to ensure that the unit costs being compared were on the same or similar basis and the NIE unit costs were benchmarked on a direct cost and a total cost basis that includes closely associated indirect costs. We assumed that the make-up of costs was, therefore consistent with the Ofgem definitions above for the benchmarking exercise.

In undertaking the analysis PB applied an average uplift to its derived direct cost to allow for the closely associated indirect costs and derive a total cost. The uplift was 17% for distribution, in line with the average indirect uplift submitted by DNOs for the DPCR5 review and for transmission, 7.5% for substation plant assets and 10% for overhead lines.

SKM confirmed that the methodology applied is appropriate and that the unit cost benchmarking is comprehensive and is based on a reasonable set of unit cost data. The overall conclusion of SKM and UR is that the NIE direct costs are generally lower than the benchmark costs even after allowing for regional price differences.

When indirect costs were analysed in a similar manner, NIE's indirect costs were found to be in the order of 32% of direct costs compared with the benchmark of 17%. This is a significant difference and appears to suggest that NIE's indirect costs are too high.

Following clarification from NIE and PB it became clear that the uplift applied covered only a subset of the costs that Ofgem describe as closely associated indirect costs and included only the following categories:

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

It does not allow for the other Closely Associated Indirect (CAI) costs which are:

- Control centre;
- Call centre;
- Stores; and
- Operational training.

We can confirm NIE/PB's assessment of the average relationship between closely associated costs and direct costs was in the order of 24% in the DPCR5 final proposals and 17% for the subset used in the PB analysis. We note that a broadly similar relationship can be observed in the GB DNO business plan submissions for the current regulatory review (RIIO-ED1).

It is apparent that there has been a lack of clarity and understanding regarding what is actually included in NIE's total costs and how comparable they are with derived benchmark costs. We understand that NIE's unit costs on a total cost basis will effectively include an allowance for the full range of the activities undertaken by the Powerteam, and these will include some business support costs in addition to some indirect costs.

We believe that regulators would expect to see efficiencies in operation over time, particularly for indirect activities. However, in view of the confusion of the comparability of the indirect element of NIE's total costs with benchmark data we welcome the work being undertaken by the Competition Commission to review these costs. Therefore we make no further comment relating to a general efficiency reduction pending the conclusion of that work.

In NIE's Request, NIE also separated out some key categories of indirect costs to include:

- Project Management & Design Consultancy for Transmission and Distribution (Projects D20 and T23),
- Capital Programme Delivery Overheads for Transmission and Distribution (Projects D45 and T41)
- Distribution Overhead Line Fixed Costs (Project D12)

We have worked on the basis that the appropriate costs for individual projects should include an allowance for CAI costs and therefore the CAI costs claimed under separate projects (D12, D20, D45, T23 and T41) should be allowed for in the project costs where applicable. Where NIE has expressly stated that indirect costs such as project management and design consultancy have not been included in project costs, we have allocated these to each project as appropriate.

As there will be differences in approach between Ofgem and UR we have followed UR's principles and approach. We suggest the following treatment for these projects, pending the conclusion of the benchmarking review of indirect costs:

- Project Management and Design Consultancy – Where our assessment differs from NIE's Request we have taken a pro-rata of costs to produce a final figure. These costs apply to Plant-related projects only based on the tables in UR67 where there is no allocation of Project Management and Consultancy costs to OHL projects.
- Capitalised Overheads associated with delivery of the capital programme have been allowed but with pro-rata across the total capex programme of our assessment against UR's Final Determination.
- Distribution Overhead Lines Fixed Costs: in line with UR, we have disallowed this item on the basis that that the costs should be included in the overall OHL programme which is a major element of the capex programme.

Our approach assumes that other indirect costs (e.g. business support) other than the closely associated indirect costs will be recovered by means other than through unit costs and if this is not the case these costs will need to be subject to a separate allowance.

Direct Costs

BPI has carried out a review of the NIE direct costs in order to determine, as far as we are able, that they are reasonable. The direct unit costs should include the basic supply of materials and installation as would be incurred by NIE, or any other DNO, or paid to a contractor to carry out the work on their behalf.

We have not conducted a full benchmarking study but an assessment of the reasonableness or otherwise of the NIE direct costs. We carried out this review using publicly available cost data from the GB companies as well as from our own corporate data including that from our parent company's ESI construction division, Freedom Group.

The NIE direct costs have been extracted, where possible, from the various NIE Strategy Papers (in 09/10 prices). As part of the data used as comparison for distribution network projects and volumes we have collated publicly available data from the DNO submissions for asset replacement for the RIIO – ED1 price review (corrected to 09/10 prices). For transmission projects and volumes, where publicly available data is not as readily available, we have carefully reviewed the benchmarking approach undertaken by PB Power and have generally supported their conclusions on direct costs.

Table 5 provides the unit cost comparison for those major asset categories, where comparable unit costs are available. For some other asset categories there are no directly comparable costs; nevertheless we believe that the identified costs span sufficient assets to enable us to provide an opinion on the level of the NIE direct costs.

Table 5 –Comparison between NIE Direct costs and RIIO – ED1

Asset	Unit	RIIO_ED1				NIE Extracted unit cost	% variance
		DNO ED1 High	DNO ED1 Low	ED1-Median	ED1 Median to 09/10 prices		
110/33kV transformer	1	1.183,000	665,000	952,000	846,560	892,904	5.5
33/11kV transformer	1	531,000	184,000	376,000	330,880	280,000	-15.4
11kV GM transformer	1	14,500	8,300	11,300	9,944	23,307	134.4
11kV RMU	1	14,200	8,300	10,170	8,850	9,770	9.2
11kV primary CB	1	52,600	22,900	30,800	27,104	40,988	51.2
33kV indoor CB	1	99,100	51,400	88,900	78,232	86,078	10.0
33kV outdoor CB	1	214,000	42,500	72,300	63,624	58,656	-7.8
LV cable	Km	163,100	65,700	97,700	85,976	87,848	2.2
11kV cable	Km	314,000	68.300	100,900	88,792	73,321	-17.4
33kV cable	Km	345,400	142,900	228,800	201,344	232,562	15.5
33kV overhead line	Km	72,100	13,100	29,900	26,312	18,894*	-28.2
11kV overhead line	km	49,000	15,700	19,800	17,424	16,927*	-2.9

*Note: NIE overhead line costs are for re-engineering only

This is an indicative comparison based on general assumption as to the scope of the work entailed in each asset class.

A number of factors also need to be considered when comparing Ofgem DNO and NIE costs:

- NIE utilise Powerteam to carry out much of their work and there may be some indirect items included within the overall NIE costs, which Ofgem has excluded for unit cost comparisons. However, BPI believes this will not affect the NIE costs to the extent that it makes a relative comparison with the Ofgem costs difficult.
- Generally the GB DNOs, because of the relative sizes of their networks and especially when licence areas are combined under a single owner, possess considerably more purchasing power than NIE and consequently should be able to benefit from lower prices for plant, equipment and contractor services.
- There is no direct comparison with the 110kV system. The GB DNO equivalent is 132kV and there are likely to be cost differences due to the different voltage levels.

Table 5 provides a list of asset types together with DNO costs calculated from publicly available data submitted as part of the companies' RIIO ED1 8 year business plans. To aid comparisons, a GB DNO high and low cost has been included from the available information together with the industry median. For a meaningful comparison with NIE costs, which we understand were formulated in 2009/10 for RP5, the ED1 median has been adjusted similarly to 2009/10 costs.

Table 6 provides a commentary on the individual assets as a comparison between NIE and RIIO-ED1.

Table 6 - Comments on asset replacement costs

Asset	Comparable With Ofgem ED1	Comment
110/33kV transformer	✓	n/a
33/11kV transformer	✓	Less than DNO equivalent
11kV GM transformer	x	Outlier. It is likely the NIE cost includes additional equipment such as cabling and the low voltage switchgear etc. However, even then this transformer cost appears high.
11kV RMU	✓	n/a
11kV primary CB	x	Within the spread of costs but at the high end of the range. Difference probably due to switchgear type and specification.
33kV indoor CB	✓	n/a
33kV outdoor CB	✓	n/a
LV Cable	✓	n/a
11kV cable	✓	Less than DNO equivalent
33kV cable	x	High but cable lying is subject to many variables e.g. ground type affects excavation and reinstatement costs.
33kV overhead line	✓	GB DNO costs are for the complete rebuild of lines and we understand include an element of tree cutting. The NIE costs are for re-engineering only and, although they include an element of rebuild, nonetheless we would expect these to be significantly less than the DNO rebuild costs as demonstrated in the case of 33kV lines. Consequently we believe the NIE 11kV overhead line re-engineering costs to be high on a direct cost basis.
11kV overhead line	x	

Considering Table 5, and particularly the variance between the Ofgem RIIO-ED1 industry median and NIE's costs, it is BPI's view that generally NIE's direct costs are comparable. Even within the GB DNOs there is often a very wide range of costs and the NIE costs, apart from one significant outlier, all sit within that range. However, the costs associated with the re-engineering of overhead lines carried out by NIE are difficult to compare. The relevant costs obtained from the DNOs are for a complete rebuild whereas the NIE re-engineering costs

include only an element of that. The 33kV line costs appear to substantiate this being somewhat less than the DNO figure but the 11kV costs are much the same, indicating the latter are on the high side. We note the detailed work carried out by PB Power in benchmarking NIE's costs and the conclusions that were reached including its assessment that the NIE overhead line costs are comparable with its comparator, DPCR5.

Nonetheless, our initial comparison study has indicated that there are some areas that would benefit from further investigation.

Asset Lifetime

UR has relied on a lifetime prediction model by SKM which is based on a population of equipment used in Great Britain DNO's to predict a survivor rate and hence dates for replacement. NIE use primarily a risk and condition based approach which takes into account the criticality of the assets within the network to assess and identify candidates for replacement.

In a number of the projects there is a major difference in the NIE predicted volumes for asset replacement which has been determined by condition and risk assessment method compared with the results of the SKM model. Both approaches have considerable value but it is our view that they should not be used in isolation. A detailed and sophisticated model may not always take into account local condition assessment and hence the life expectancy of certain assets. NIE appear to have a number of initiatives in hand to collect and analyse more asset information to better support replacement decisions.

For a number of projects the difference between the inferred life time of NIE assets and that determined from the SKM model is as much as 10 years. There is no real explanation why there should be such a big difference and we were not presented with maintenance records or historical condition information to assess the variance.

Generally we believe both approaches, taken by UR and NIE to determine asset replacement volumes, are imperfect. Although we accept the DNO modelling used by Ofgem is now reasonably refined and , for the large populations within GB, provides a sound methodology to determine volumes and expenditure, we do not believe it can be transferred simply to NIE's network. NIE has relatively small populations of plant and additionally the acceptance of age as a proxy for condition must be treated with caution. NIE has not been a part of the Ofgem regulatory regime and it cannot therefore be assumed that asset replacement age will fall as predicted by the standard deviation.

Notwithstanding both UR's and NIE's comments during the meetings, we have generally given support to the NIE forecasts, though not necessarily the total request in all cases, on the basis of local knowledge and engineering judgement. It is recognised that the NIE's approach for the determination of asset replacement numbers for large items of plant could be refined with clarity over definitions and better defined criteria and cut-off points.

We note the Regulator criticises some of NIE's data analysis (e.g. Dissolved Gas Analysis) but within the confines of our brief, by necessity, accept the overall NIE conclusions. Although we have considered both methodologies when reviewing the asset replacement volumes, overall we have attached more weighting to asset condition than the Regulator has in its approach.

Load Forecasts

A number of the load-related projects are underpinned by load forecasts. Within the documents there are a number of remarks and discussion between deterministic and more sophisticated probabilistic modelling. Again, both approaches have merit but will produce different results. There are also a number of major influences on load such as renewable generation, the lifetime of the older Ballylumford Generators and the take up of the Titanic Quarter by new business. We are generally of the opinion where there is this degree of uncertainty projects should not be progressed until there is more certainty. We do believe there is enough evidence in the documentation to support a more rapid build-up of infrastructure in the Titanic Quarter but in most cases there is still some doubt on load predictions.

Tree-cutting costs

We have examined the tree-cutting costs in detail as part of the OHL projects. PB and SKM have benchmarked NIE's tree cutting costs and the NIE costs have been found to be lower than GB DNOs in general. PB and SKM also concluded that in fact GB DNOs are not a good comparator as there are significant differences in tree cover, regulations (ESQCR) and working practices. The Republic of Ireland DSO provides a much better comparison but still has higher tree cover and they use contractors compared to in-house staff. UR proposed in the final Determination a tree cutting allowance that was a saving of one third on existing tree cutting costs. This has been rejected by NIE as being wholly insufficient. We recognise that some savings could be made and originally recommended a reduction based on comparisons of benchmarks of about 22%.

NIE have subsequently confirmed that some of the cost reduction could be considered as double counting and so we have accepted the revised reduction of 10% proposed by NIE as a reasonable adjustment. The project costs have been amended accordingly.

Necessity and timing

We have assessed the projects against this criteria based on the information available and the justification provided. In some cases we do not accept that there is a case for the projects and this will be reflected in the notes.

6. Discussion Points

Summary of Discussion Points

During this review and the two documented discussions a number of key topics were visited and these also raised additional supporting material. BPI acknowledges the representations made by NIE and UR at the meetings and the supplementary information that was submitted. A list of documentation reviewed by BPI during this review is attached in Attachment 3.

The topics covered at the meetings included, but were not limited to, the following:

- Overhead Line Costs - including: Overheads, Fixed Costs and Indirect Costs and Tree-cutting costs.
- Asset Lifetime and application of Lifetime Modelling applied to Transformers, Reactors and other plant related projects
- Asset Condition monitoring, scoring and decision making
- ESQCR Commitments.
- Network Resilience of 11kV Overhead Line.
- Load-Related projects and assumption based on developments regarding the Titanic Quarter and the Ballylumford Power Station.
- Storm costs and Exceptional Events
- Fault & Emergency and Reactive Projects
- Flooding Protection
- Energy Efficiency and Smart Metering implications

We have carefully considered all the points raised by both parties. We have noted the concerns raised by the UR regarding public interest and upward bias and have sought to reduce the recommended expenditure where we see it is acceptable to do so without compromising the network

We have also removed the indirect cost efficiency factor (10%) applied to projects and to the design and consultancy costs.

Summary of Key Decisions on specific projects

Overhead Line Projects and OHL Fixed Costs

We have reviewed the distribution OHL projects and have taken into account the comments on lifetime of conductors being lower than GB DNO expected asset life but have recommended that the NIE requested volumes of re-engineering and refurbishment remain. These volumes which are a significant increase on RP4, we believe reflect the reported deterioration of some lines due to saline corrosion and hence reduced lifetime.

We do believe that the unit rates require further examination as there is an increase on the re-engineering costs inferred from RP4 costs which we understood to be total costs and included overheads. We therefore await clarification from the outcome of CC's review of indirect costs. In addition because we have made a full allowance for the requested OHL volumes, we recommend removing £2.0million from the reactive project budget which still leaves £4.5million for reactive and unplanned works.

Asset Lifetime and Lifetime modelling

This has been discussed in detail in sections above. We have also recognised that NIE;'s condition monitoring and risk scoring processes could be enhanced and have followed the UR recommendation to invest in further condition monitoring equipment for Transmission transformers.

ESQCR

The guiding principle for ESQCR is that the regulations should become common standards across the business and built into day to day operations as best practice. There is obviously an incremental change to NIE's operating procedures and standards and we have recommended an allowance for the audit and more patrollers for the survey to prepare a plan and develop the asset database as reasonable to identify the incremental expenditure for RP6.

Network Resilience

We have not recommended any allowance in RP5 for the Network resilience project to counter ice accretion. We have assumed that the more critical sections of overhead line will be replaced in due course within the allowances for overhead line engineering.

Asset Replacement

We have recommended increased allowances for asset and component replacement as we believe that local condition assessment and engineering judgement of asset performance should be given weighting in the decision making process.

Titanic Quarter

Our understanding of the evidence presented indicated that there was considerable demand for this development and that only allowing 50% in RP5 would not enable the development of primary infrastructure components. We do understand the connections charging issue and recommend that this needs to be addressed but we have recommended that the entire project should be allowed in RP5. It was also mentioned that a CHP plant has applied for planning permission to be installed in the area but we also understand that this will not affect the proposed infrastructure requested and could take a number of years to come fruition.

Storm and Post-Storm Costs

BPI have not allowed projects D19 Storms and D21 Post storm repairs due to the allowances already covered in the in the existing 'Reactive' and "Fault and Emergency" contingency allowance and asset replacement programmes.

We understand that there is an on-going discussion to set a clear definition and policy for "exceptional" events ex post.

Flooding Protection

BPI has recommended an allowance for flooding protection for the five sites that have been flooded previously and not for other sites.

Energy Efficiency and Smart Metering

BPI acknowledges the efforts and initiatives being made by the UR and NIE to introduce and encourage take up of these energy efficiency measures. The potential impact on load is difficult to determine but in any case is unlikely to significantly affect overall demand within this price period.

7. Summary of Outcome

The summary of the outcome of the review is presented in Table 7 below. The following pages show the complete list of projects based on a full RP5 period. The detailed project assessment for those projects where there was a material difference in NIE Request and UR's Final Determination are listed in Appendix 1.

Table 7 - Summary Results of BPI Review of Core Capital Expenditure

	NIE Request	UR FD	BPI Recomm.
	£m	£m	£m
Part A Core Capex			
Transmission			
Asset replacement	87.1	74.8	81.9
Load related	37.4	26.2	29.2
sub-total	**124.5**	**101.0**	**111.1**
Distribution			
Asset replacement	229.5	187.8	222.8
Load related	24.6	19.6	22.3
sub-total	**254.1**	**207.5**	**245.2**
Legislation	29.4	5.7	6.8
Customer Priorities	12.5	1.8	2.4
Overheads	57.3	15.7	20.4
Network IT	3.7	3.7	3.7
Smart Grid	9.4	0.0	3.0
Fund 3 Projects	43.4	43.4	43.4
11kV Network Resilience	35.0	0.0	0.0
	190.7	**70.2**	**79.7**
RPEs	37.5	0.6	0.6
Total Part A	**606.7**	**379.3**	**436.6**
Part B Other Capex			
Connections	37.3	37.3	37.3
Metering	27.5	10.5	10.5
Keypad metering	10.0	10.0	10.0
Non-network capex	15.2	7.6	7.6
Network Management system (Upgrade)	2.1	0.0	0.0
Total Part B	**92.0**	**65.4**	**65.4**
TOTAL PARTS A & B	**698.8**	**444.7**	**502.0**

Note: For Reconciliation purposes , items outside of BPI scope (shaded grey) have been entered as per UR Final Determination

8. Conclusions

BPI has conducted a thorough review of the UR's Final Determination and NIE's Request and the differences between them. We have made our recommendation based on the full RP5 period in order that there is a common basis for all the projects. Some form of adjustment will need to be made for the shortened RP5 period.

We have reviewed each project on its own merits and we have not taken into account any interdependencies nor resourcing limitations to make our recommendations. We have recommended essential projects for maintaining security of supply, safety of customers and the long term development of the network. We also believe that there is sufficient funds and flexibility within the overall capital programme to handle unforeseen events.

We have not taken into account the achievability of the scheme of projects detailed in this plan within this time frame. This programme of work does represent a considerable amount of network development. This comes at a time when NIE have planned to recruit or replace many skilled staff. This is a significant risk to the successful implementation of this programme as well as other constraints due to supplier and component availability. Network interruptions and outage or shut-down requirements also limits the potential delivery of some of these projects and can place additional load on parts of the network.

The categories used are defined in table 8 below:

Table 8 - Categorisation of Projects

Category	Description
A	The projects, and planned volumes of work which need to be undertaken before 1 October 2017 in order to maintain services to customers, comply with applicable network design and planning standards and/or meet any other obligations
B	The projects and planned volumes of work which, whilst not necessary to maintain services to customers, comply with applicable network design and planning standards and/or meet any other obligations, have been included in NIE's business plan for the period to 1 October 2017 with sufficient justification.
C	Any Projects or volumes of work within (B) that any reasonable electricity transmission/distribution company would undertake before 1 October 2017 because deferring or cancelling them would increase whole life costs. I.e. Category C is a subset of Category B.
D	lack of justification

In Table 9 below we summarise our recommended Fund 1 and Fund 2 Capital Expenditure allowances by category. The detailed breakdown of the projects by categories is set out in Attachment 1.

Table 9 - Summary of Fund by Category for Fund 1 and Fund 2

	NIE Request	UR FD	BPI Recomm.	BPI Recommendation Categorisation (£m)		
	£m	£m	£m	A	B	C
Part A Core Capex						
Transmission						
Asset replacement	87.1	74.8	81.9	33.2	48.7	21.1
Load related	37.4	26.2	29.2	3.9	25.2	-
sub-total	**124.5**	**101.0**	**111.1**	**37.1**	**73.9**	**21.1**
Distribution						
Asset replacement	229.5	187.8	222.8	109.6	113.2	33.8
Load related	24.6	19.6	22.3	16.1	6.3	-
sub-total	**254.1**	**207.5**	**245.2**	**125.7**	**119.5**	**33.8**
Legislation	29.4	5.7	6.8	6.3	0.5	-
Customer Priorities	12.5	1.8	2.4	1.2	1.2	0.6
Overheads	57.3	15.7	20.4	20.4	-	-
Network IT	3.7	3.7	3.7	3.7	-	-
Smart Grid	9.4	0.0	3.0	3.0	-	-
Fund 3 Projects	43.4	43.4	43.4	43.4	-	-
11kV Network Resilience	35.0	0.0	0.0	-	-	-
	190.7	**70.2**	**79.7**	**78.0**	**1.7**	**0.6**
RPEs	37.5	0.6	0.6	0.6		
Total Part A	**606.7**	**379.3**	**436.6**	**241.5**	**195.1**	**55.6**
Part B Other Capex						
Connections	37.3	37.3	37.3			
Metering	27.5	10.5	10.5			
Keypad metering	10.0	10.0	10.0			
Non-network capex	15.2	7.6	7.6			
Network Management system (Upgrade)	2.1	0.0	0.0			
Total Part B	**92.0**	**65.4**	**65.4**			
TOTAL PARTS A & B	**698.8**	**444.7**	**502.0**			

Note: For Reconciliation purposes , items outside of BPI scope (shaded grey) have been entered as per UR Final Determination

9. Acknowledgements & Participants

BPI wishes to thank the Competition Commission, Northern Ireland Electricity Limited and the Utility Regulator for their assistance and cooperation in undertaking this review.

The following individuals from BPI were involved in this project:

- Andrew Lawson
- Glen Chapman
- Gary Stokes
- Nawaz Ahmad
- Bob Lane
- John Rimell

ATTACHMENT 1 – Project Listing

FIGURE 1 - TRANSMISSION PROJECTS FUND 1

TRANSMISSION PROJECTS: FUND 1 ASSET REPLACEMENT

Fund	ID	Project Name	Brief Description of project	UR FD	NIE Request	BPI Recommendation inc. PDMC	Detailed Project Review	Amended 8/10/13	PDMC adjusted pro-rata to project costs
1	T14	110/33kVTransformers replacement	Ballymena, Donegall, Enniskillen, Knock Main substations (installed 60s/70s)	3,446,977	10,693,232	7,241,768	✓		296,248
1	T15	22kV Reactor replacement	Age expired 22kV reactors at Castlereagh, Kells, Tandragee substations	296,161	3,669,880	1,464,928	✓		59,928
1	T13	275kV/110kV Transformer Replacement	Castlereagh, Coolkeeragh, Tandragee (installed 60s/70s)	6,850,847	7,807,575	8,140,142	✓		332,567
1	T16	Transmission Transformer Refurb	Defective transformer and disconnector components	0	1,152,000	1,201,136	✓		49,136
		Sub-total		**10,593,985**	**23,322,687**	**18,047,974**			**737,879**
1	T19	110kv Overhead Line Replacement	Component replacement ongoing RP3/4/5. RP5 = remaining 25% of total	9,176,510	9,421,468	9,421,468		*	-
1	T17	275kV Overhead Line Asset Replacement	Component replacement ongoing RP4/5/6. RP5 = 30% of total	8,738,148	8,971,405	8,971,405		*	-
1	T6	Transmission Plant Switch Houses	Refurb 275kV substation buildings (Ballyumford and Kilroot power stations)	2,345,961	2,500,000	2,606,633		*	106,633
1	T21	Transmission fault & emergency	Capital work following faults on 275kV and 110kV networks	4,082,034	4,135,799	2,886,699	✓		-
1	T22	Transmission reactive	Reactive to unplanned events	713,131	722,524	522,524	✓		-
1	T20	Transmission cables	Replacement and refurbishment	4,705,000	4,705,000	4,705,000			-
1	T8	Tandragee 110kV Substation	Completion of refurb of switchgear and other equipment	3,255,904	3,206,000	3,342,746		*	136,746
1	T9	Castlereagh 110kV Substation	Replacement 110kV switchgear and other equipment	3,107,321	3,045,000	3,174,878		*	129,878
1	T11	275kV Plant Ancillaries	Replacement 275kV switchgear ancillary equipment	5,779,411	5,565,754	5,803,151		*	237,397
1	T10	110kV switchgear (3 substations)	Replacement 110kV switchgear (Ballyvallagh,Dungannon,Lisburn)	6,593,763	6,350,000	6,620,848		*	270,848
1	T12	110kV Plant Ancillaries	Replacement 110kV switchgear ancillary equipment	7,286,657	7,017,279	7,316,588		*	299,309
1	T7	Kells 110kV Substation	Replacement 110kV switchgear and other equipment	8,458,708	8,146,000	8,493,453		*	347,453
		Sub-total		**64,242,548**	**63,786,229**	**63,865,393**			**1,528,264**
		TOTAL ASSET REPLACEMENT		**74,836,533**	**87,108,916**	**81,913,367**			**2,266,143**

FIGURE 2 NIE TRANSMISSION PROJECTS FUND 2

TRANSMISSION PROJECTS: FUND 2 LOAD RELATED

Fund	ID	Project Name	Brief Description of project	UR FD	NIE Request	BPI Recommendation inc. PDMC	Detailed Project Review	Amended 8/10/13	PDMC adjusted pro-rata to project costs
				£ (2009/10)	£ (2009/10)				
2	T26	Ballyumford 110kV Switchboard Replacement	Replace switchboard, decommission existing one	15,270,000	14,707,000	15,358,313	✓	*	651,313
2	T32	Dungannon Main 110/33kV substation	2 additional transformers	0	2,360,000	0	✓		-
2	T28	Ballyumford-Eden 110kV Circuit Upgrade	Replace conductor on 15km line	0	2,310,000	0	✓		-
2	T29	Eden-Carnmoney 110kV Line Upgrade	Uprate conductor	0	2,300,000	0	✓		-
2	T27	Airport road 110/33kV substation	Due to increased demand.	2,066,392	3,980,000	4,149,760	✓		169,760
2	T33	Castlereagh-Knock 110kV Partial Cable replacement	1.8km	924,165	1,600,000	1,668,245	✓		68,245
2	T35	Ballyumford G5 & G6 cable Replacement	New cable in tunnels	0	1,600,000	0	✓		-
2	T37	Hannahstown-Lisburn 110kV Overhead Line Upgrade	Upgrade conductor on two 7km overhead lines	0	800,000	0	✓		-
Sub-Total				**18,260,557**	**29,657,000**	**21,176,318**			**889,318**
2	T39	Hannahstown & Kells 275kV Substation	Install sequence switching schemes	218,066	210,000	218,957		*	8,957
2	T38	Cregagh 110kV Substation Isolators and Earth Switches	Replacement (including structures)	415,356	400,000	417,062		*	17,062
2	T34	Tandragee 275kV Substation 2nd Bus Coupler	Establishing a 3rd protected zone	1,349,904	1,300,000	1,355,449		*	55,449
2	T30	4th transformer at Castlereagh 275/110kV substation	Increase capacity for exceptional events required by standards	2,220,888	2,169,000	2,261,514		*	92,514
2	T31	Armagh Main 110/33kV substation	New substation + associated overhead lines	2,076,775	2,000,000	2,085,306		*	85,306
2	T36	Belfast North Main 110/33kV Bulk Supply substation	New substation at Whitla Street. Already begun in RP4. Cost revised up.	1,641,104	1,615,002	1,644,006		*	29,004
Sub-total				**7,922,093**	**7,694,002**	**7,982,294**			**288,292**
TOTAL LOAD RELATED				**26,182,650**	**37,351,002**	**29,158,612**			**1,177,610**

FIGURE 3 - NIE DISTRIBUTION PROJECTS FUND 1

DISTRIBUTION PROJECTS: FUND 1 ASSET REPLACEMENT

Fund	ID	Project Name	Brief Description of project	UR FD	NIE Request	BPI Recommendation inc. PDMC	Detailed Project Review	Amended 8/10/13	PDMC adjusted pro-rata to project costs
				£ (2009/10)	£ (2009/10)				
1	D8	11kV Overhead Lines	Refurbishment on cyclic basis	51,200,000	68,260,248	66,040,998	✓		0
1	D15	Secondary substations	Asset replacement and refurbishment	32,186,086	37,807,990	39,000,663	✓	*	2,323,673
1	D9	LV Lines	Refurbishment on cyclic basis	17,150,000	21,411,154	20,536,085	✓	*	0
1	D7	33kV Overhead Lines	Refurbishment of OHL	8,800,000	11,552,032	11,219,417	✓	*	0
1	D14	Primary Transformers	Replace 32 age expired transformers	3,907,377	10,071,761	10,709,858	✓		638,098
1	D6	Distribution Tower Lines	Replace poor condition overhead line steel tower components	1,363,600	2,253,500	1,493,500	✓		0
1	D19	Storms	Capitalised costs with storms eg replacement post storms	520,000	2,600,000	0	✓		0
1	D21	Post storm repairs	Re storm March 2010	0	2,000,000	0	✓		0
Sub-total				**115,127,063**	**155,956,685**	**149,000,521**			**2,961,771**
1	D10	Undereaves	Replace undereaves wiring at rate of 3200 premises pa	11,490,666	11,919,778	11,919,778		*	0
1	D13	Primary Plant	Replace 6.6/11/33kV switchgear and other equipment	30,783,543	31,156,746	33,130,683		*	1,973,937
1	D17	Distribution Fault and Emergency	Unanticipated which results in capitalised works	12,810,377	12,939,775	12,939,775	✓	*	0
1	D18	Distribution reactive	Generally reactive unplanned work	10,634,162	10,741,578	8,741,578	✓		0
1	D11	LV cut-outs	Replace house service cut-outs at 8000 properties	1,766,048	1,832,000	1,832,000		*	0
1	D16	Distribution cables	Cable replacement, condition monitoring and refurb (fluid filled)	5,230,133	4,948,000	5,261,481		*	313,481
Sub-total				**72,714,929**	**73,537,877**	**73,825,295**			**2,287,418**
TOTAL FUND 1				**187,841,992**	**229,494,562**	**222,825,816**			**5,249,189**

FIGURE 4 - NIE DISTRIBUTION PROJECTS FUND 2

DISTRIBUTION PROJECTS: FUND 2 LOAD RELATED

Fund	ID	Project Name	Brief Description of project	UR FD	NIE Request	BPI Recommendation inc. PDMC	Detailed Project Review	Amended 8/10/13	PDMC adjusted pro-rata to project costs
2	D36	33/11kV Transformers	Relieve highly loaded transformers at 15 sites	1,982,969	4,462,000	3,260,246	✓		194,246
2	D22	Airport Road / Titanic Qtr (Distribution)	To increase supply to this area	1,247,564	2,260,000	2,403,182	✓		143,182
2	D27	Dungannon Main 33kV Switchboard	New switchboard	0	1,120,000	0	✓		0
		Sub-total		**3,230,533**	**7,842,000**	**5,663,428**			**337,428**
2	D38	LV Load related	Reinforcement where overloading and voltage problems have arisen	4,796,440	4,840,000	4,840,000		*	0
2	D37	11kV Load related	Reinforcement on planned and reactive basis	1,740,000	1,740,000	1,740,000			0
2	D34	Whitehouse 33kV reinforcement	Replace section of cable	169,123	160,000	170,137		*	10,137
2	D29	Brookhill 33kV reinforcement	Rebuilding overhead curcuits	561,561	550,000	584,845		*	34,845
2	D32	Strand Road 33kV reinforcement	Replace remaining small cable	369,957	350,000	372,174		*	22,174
2	D28	Tullyvannon 33/11kV substation	New substation and associated work	585,091	560,000	595,479		*	35,479
2	D25	Roslea 33/11kV substation	New substation and associated work	733,794	700,000	744,349		*	44,349
2	D26	Castelderg 33/11kV substation	Reinforce network by providing a second supply	1,208,119	1,160,000	1,233,492		*	73,492
2	D30	Belfast North Main 110/33kV substation	Completion of works on a new substation at Whitla Street	961,888	910,000	967,653		*	57,653
2	D23	Creagh/Maghera/Magherafelt 33kV system	New wood pole overhead line circuits	2,828,225	2,770,000	2,945,494		*	175,494
2	D24	Cookstown 33kV systems reinforcement	Cable interconnection and wood pole overhead line	2,431,954	2,340,000	2,488,251		*	148,251
2	D31	Granville 33kV reinforcement	Rebuild overhead circuit	0	310,000	0			0
2	D33	Gallaghers 33kV reinforcement	Replace section of overhead line	0	270,000	0			0
2	D35	Limavady town 33kV reinforcement	Replacement of section of overhead line	0	100,000	0			0
		Sub-total		**16,386,152**	**16,760,000**	**16,681,874**			**601,874**
		TOTAL FUND 2		**19,616,685**	**24,602,000**	**22,345,302**			**939,302**

FIGURE 5 - NIE FUND 3 AND OTHER PROJECTS

OTHER PROJECTS

Fund	ID	Project Name	Brief Description of project	UR FD	NIE Request	BPI Recommendation inc. PDMC	Detailed Project Review
Legislation							
1	D43	ESQCR (Distribution)	New safety standards introduced in NI	1,000,000	23,000,000	2,305,000	✓
1	T40	ESQCR (Transmission)	New NI safety standard regulation	250,000	2,000,000	75,000	✓
1	D44	Roads and Street Works	Street Works legislation	4,400,000	4,400,000	4,400,000	
		Sub-total Legislation		**5,650,000**	**29,400,000**	**6,780,000**	
Customer Priorities							
	D48	11kV Network Performance	Remote control facilities applied to the rural network.	0	9,000,000	0	✓
	D51	Public Realms	Replacement in conjunction with urban regeneration projects	850,000	850,000	850,000	
	T42	Transmission Substation Flooding Enforcement	Permanent protection to substations assessed as at risk	618,000	618,000	641,724	
	D50	Distribution Substation Flooding Enforcement	Permanent protection to several Primary Distribution susbstations	311,250	2,075,000	903,851	✓
		Sub-total Customer Priorities		**1,779,250**	**12,543,000**	**2,395,575**	
Overheads							
1	D45	Capitalised overheads (Distribution)	Cost areas involved in the delivery of capital projects	13,829,019	23,568,000	18,162,162	✓
1	D12	DistributionOverhead Lines Fixed Costs	Programming and management of the overhead line refurb	0	18,063,754	0	✓
1	D20	Distribution design and consultancy	Direct and consultancy work for design & project management	0	6,676,389	0	✓
1	T23	Transmission design and consultancy	Direct and external substation design for certain projects	0	5,338,879	0	✓
1	T41	Capitalised overheads (Transmission)	Areas and departments involved with delivery of capital projects	1,857,055	3,627,000	2,268,731	✓
		Sub-total Overheads		**15,686,074**	**57,274,022**	**20,430,893**	
Network Resilience							
1	D56	25mm2 Overhead Line	Network Resilience	0	35,000,000	0	✓
Smart Grid							
2	D49	Smart Grid	Application of smart technologies and Condition Monitoring	-	9,350,000	3,000,000	✓

FIGURE 6 – PROJECTS OUT OF BPI SCOPE

ADDITIONAL ITEMS (OUT OF BPI SCOPE)

Fund	ID	Project Name	Brief Description of project	UR FD	NIE Request	BPI Recommendation
PART A CORE CAPEX CONT'D						
Network IT						
	D39	Distribution SCADA	System providing real time data to improve control of the network	1,299,000	1,299,000	
	D41	Operational telecoms network	Private telecoms network solely for operational traffic.	2,392,000	2,392,000	
		Sub-total Network IT		**3,691,000**	**3,691,000**	as per FD
Fund 3 Items						
3	T24	Castlereagh and Tandragee Voltage Support	Subject to further detailed study	17,950,000	17,950,000	
3	T18	Coolkeeragh-Magherafelt 275kV Overhead Line	Conductor replacement (55km)	15,000,000	15,000,000	
3	T25	North West Reactive Compensation	Block of fixed capacitors and statcom/SVC plus at Coolkeragh	10,470,000	10,470,000	
		Sub-total Fund 3 Items		**43,420,000**	**43,420,000**	as per FD
RPEs						
	D43	RPEs Distribution	Retail Price Effects	400,000	-	
	T57	RPEs Transmission	Retail Price Effects	200,000	-	
		Sub-total RPEs		**600,000**	**37,490,409**	as per FD
SUB-TOTAL PART A CONT'D				**47,711,000**	**84,601,409**	as per FD
PART B OTHER CAPEX						
Connections						
2	D46	Customer connections	Connect / modify connections. Ringfenced.	37,255,000	35,555,000	"
2	D47	Roads and Street Works - Connections	Street Works legislation	0	1,700,000	"
		Sub-total Connections		**37,255,000**	**37,255,000**	as per FD
Metering						
2	D42	Metering	Domestic (220k) and Commercial (18k) - replacement. Ringfenced.	8,605,000	8,605,000	"
2	D54	Metering Certification / Re-certification	Until smart meters roll out begins. Ring fenced	1,900,000	18,867,000	"
		Sub-total Metering		**10,505,000**	**27,472,000**	as per FD
2	D52	Keypad Metering	Undertaken until smart meters roll out. Ringfenced.	10,000,000	10,000,000	"
2	D55	Non-network IT and Telecoms and Other	IT/Corporate Telecoms/Business IT/Renewables Development Gp	7,637,500	15,192,000	"
2	D40	Network / Trouble Management Systems	Upgrade and extend current systems	-	2,107,000	"
		TOTAL PART B		**65,397,500**	**92,026,000**	**65,397,500**

ATTACHMENT 2 – Projects by A, B, C Category

TRANSMISSION PROJECTS

Fund	ID	Project Name	UR FD	NIE Request	BPI Recommendation inc. PDMC	BPI Recommendation Categorisation (%)				BPI Recommendation Categorisation (£)			
						A	B	C	D	A	B	C	D
ASSET REPLACEMENT													
1	T14	110/33kVTransformers replacement	3,446,977	10,693,232	7,241,768		100			-	7,241,768	-	-
1	T15	22kV Reactor replacement	296,161	3,669,880	1,464,928	33	67	50		483,426	981,502	490,751	-
1	T13	275kV/110kV Transformer Replacement	6,850,847	7,807,575	8,140,142		100	50		-	8,140,142	4,070,071	-
1	T16	Transmission Transformer Refurb	-	1,152,000	1,201,136	30	70	50		360,341	840,795	420,398	-
1	T19	110kv Overhead Line Replacement	9,176,510	9,421,468	9,421,468	25	75	50		2,355,367	7,066,101	3,533,051	-
1	T17	275kV Overhead Line Asset Replacement	8,738,148	8,971,405	8,971,405	25	75	50		2,242,851	6,728,554	3,364,277	-
1	T6	Transmission Plant Switch Houses	2,345,961	2,500,000	2,606,633		100	100		-	2,606,633	2,606,633	-
1	T21	Transmission fault & emergency	4,082,034	4,135,799	2,886,699	100				2,886,699	-	-	-
1	T22	Transmission reactive	713,131	722,524	522,524	100				522,524	-	-	-
1	T20	Transmission cables	4,705,000	4,705,000	4,705,000	100				4,705,000	-	-	-
1	T8	Tandragee 110kV Substation	3,255,904	3,206,000	3,342,746	100				3,342,746	-	-	-
1	T9	Castlereagh 110kV Substation	3,107,321	3,045,000	3,174,878	100				3,174,878	-	-	-
1	T11	275kV Plant Ancillaries	5,779,411	5,565,754	5,803,151	100				5,803,151	-	-	-
1	T10	110kV switchgear (3 substations)	6,593,763	6,350,000	6,620,848		100	100		-	6,620,848	6,620,848	-
1	T12	110kV Plant Ancillaries	7,286,657	7,017,279	7,316,588	100				7,316,588	-	-	-
1	T7	Kells 110kV Substation	8,458,708	8,146,000	8,493,453		100			-	8,493,453	-	-
		TOTAL ASSET REPLACEMENT	**74,836,533**	**87,108,916**	**81,913,367**					**33,193,571**	**48,719,796**	**21,106,028**	-
LOAD RELATED													
2	T26	Ballyumford 110kV Switchboard Replacement	15,270,000	15,270,000	15,358,313		100			-	15,358,313	-	-
2	T32	Dungannon Main 110/33kV substation	-	2,360,000	-				100	-	-	-	-
2	T28	Ballyumford-Eden 110kV Circuit Upgrade	-	2,310,000	-				100	-	-	-	-
2	T29	Eden-Carnmoney 110kV Line Upgrade	-	2,300,000	-				100	-	-	-	-
2	T27	Airport road 110/33kV substation	2,066,392	3,980,000	4,149,760		100			-	4,149,760	-	-
2	T33	Castlereagh-Knock 110kV Partial Cable replacement	924,165	1,600,000	1,668,245	100				1,668,245	-	-	-
2	T35	Ballyumford G5 & G6 cable Replacement	-	1,600,000	-				100	-	-	-	-
2	T37	Hannahstown-Lisburn 110kV Overhead Line Upgrade	-	800,000	-				100	-	-	-	-
2	T39	Hannahstown & Kells 275kV Substation	218,066	210,000	218,957		100			-	218,957	-	-
2	T38	Cregagh 110kV Substation Isolators and Earth Switch	415,356	400,000	417,062		100			-	417,062	-	-
2	T34	Tandragee 275kV Substation 2nd Bus Coupler	1,349,904	1,300,000	1,355,449		100			-	1,355,449	-	-
2	T30	4th transformer at Castlereagh 275/110kV substation	2,220,888	2,169,000	2,261,514	100				2,261,514	-	-	-
2	T31	Armagh Main 110/33kV substation	2,076,775	2,000,000	2,085,306		100			-	2,085,306	-	-
2	T36	Belfast North Main 110/33kV Bulk Supply substation	1,641,104	1,615,002	1,644,006		100			-	1,644,006	-	-
		TOTAL LOAD RELATED	**26,182,650**	**37,914,002**	**29,158,612**					**3,929,759**	**25,228,853**	**-**	**-**
		TOTAL TRANSMISSION	**101,019,183**	**125,022,918**	**111,071,979**					**37,123,330**	**73,948,649**	**21,106,028**	**-**

DISTRIBUTION PROJECTS

Fund	ID	Project Name	UR FD	NIE Request	BPI Recommendation inc. PDMC	BPI Recommendation Categorisation (%)				BPI Recommendation Categorisation (£)			
ASSET REPLACEMENT						**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**
1	D8	11kV Overhead Lines	51,200,000	68,260,248	66,040,998	35	65	25		23,114,349	42,926,649	10,731,662	-
1	D15	Secondary substations	32,186,086	37,807,990	39,000,663	30	70	50		11,700,199	27,300,464	13,650,232	-
1	D9	LV Lines	17,150,000	21,411,154	20,536,085	30	70	50		6,160,826	14,375,260	7,187,630	-
1	D7	33kV Overhead Lines	8,800,000	11,552,032	11,219,417	35	65	25		3,926,796	7,292,621	1,823,155	-
1	D14	Primary Transformers	3,907,377	10,071,761	10,709,858		100			-	10,709,858	-	-
1	D6	Distribution Tower Lines	1,363,600	2,253,500	1,493,500		100	30		-	1,493,500	448,050	-
1	D19	Storms	520,000	2,600,000	-				100	-	-	-	-
1	D21	Post storm repairs	-	2,000,000	-				100	-	-	-	-
1	D10	Undereaves	11,490,666	11,919,778	11,919,778	100				11,919,778	-	-	-
1	D13	Primary Plant	30,783,543	31,156,746	33,130,683	100				33,130,683	-	-	-
1	D17	Distribution Fault and Emergency	12,810,377	12,939,775	12,939,775	50	50			6,469,888	6,469,888	-	-
1	D18	Distribution reactive	10,634,162	10,741,578	8,741,578	100				8,741,578	-	-	-
1	D11	LV cut-outs	1,766,048	1,832,000	1,832,000	100				1,832,000	-	-	-
1	D16	Distribution cables	5,230,133	4,948,000	5,261,481	50	50			2,630,741	2,630,741	-	-
		TOTAL ASSET REPLACEMENT	**187,841,992**	**229,494,562**	**222,825,816**					**109,626,837**	**113,198,980**	**33,840,729**	**-**
LOAD RELATED													
2	D36	33/11kV Transformers	1,982,969	4,462,000	3,305,971	60	40			1,983,582	1,322,388	-	-
2	D22	Airport Road / Titanic Qtr (Distribution)	1,247,564	2,260,000	2,403,182	100				2,403,182	-	-	-
2	D27	Dungannon Main 33kV Switchboard	-	1,120,000	-				100	-	-	-	-
2	D38	LV Load related	4,796,440	4,840,000	4,840,000	50	50			2,420,000	2,420,000	-	-
2	D37	11kV Load related	1,740,000	1,740,000	1,740,000	40	60			696,000	1,044,000	-	-
2	D34	Whitehouse 33kV reinforcement	169,123	160,000	170,137		100			-	170,137	-	-
2	D29	Brookhill 33kV reinforcement	561,561	550,000	584,845	100				584,845	-	-	-
2	D32	Strand Road 33kV reinforcement	369,957	350,000	372,174		100			-	372,174	-	-
2	D28	Tullyvannon 33/11kV substation	585,091	560,000	595,479	100				595,479	-	-	-
2	D25	Roslea 33/11kV substation	733,794	700,000	744,349	100				744,349	-	-	-
2	D26	Castelderg 33/11kV substation	1,208,119	1,160,000	1,233,492	100				1,233,492	-	-	-
2	D30	Belfast North Main 110/33kV substation	961,888	910,000	967,653		100			-	967,653	-	-
2	D23	Creagh/Maghera/Magherafelt 33kV system	2,828,225	2,770,000	2,945,494	100				2,945,494	-	-	-
2	D24	Cookstown 33kV systems reinforcement	2,431,954	2,340,000	2,488,251	100				2,488,251	-	-	-
2	D31	Granville 33kV reinforcement	-	310,000	-				100	-	-	-	-
2	D33	Gallaghers 33kV reinforcement	-	270,000	-				100	-	-	-	-
2	D35	Limavady town 33kV reinforcement	-	100,000	-				100	-	-	-	-
		TOTAL LOAD RELATED	**19,616,685**	**24,602,000**	**22,391,027**					**16,094,674**	**6,296,352**	**-**	**-**
		TOTAL DISTRIBUTION	**207,458,677**	**254,096,562**	**245,216,843**					**125,721,511**	**119,495,332**	**33,840,729**	**-**

ATTACHMENT 3 – Review of OHL Tree Cutting Costs

OHL Review comments for BPI CC report Referenced 33kV and 11kV Distribution Projects

In the review of 33kv and 11kV overhead line projects, BPI has found two key areas of significance:-

1. Differing approach to asset replacement assessment; NIE's 'bottom up' condition based approach compared with the Utility Regulators' 'top down view' comparing NIE against other distribution businesses.
2. Differences in tree cutting allowances based on benchmarking studies.

Asset Replacement (Perpetual Asset Strategy):

In summary NIE use three separate but coordinated programmes of

- Targeted Asset Replacement (TAR) –At individual pole level (3 year cycle) proactively targeting defects not prioritised for Refurbishment.
- Refurbishment – At each line level replacing major defective components (but not conductors) – (15 year cycle)
- Reengineering – When a small number of circuits from the refurbishment programme assess reconductoring is essential due to extremely poor condition. Reengineering will look to use the opportunity to improve circuit design also.

NIE have set out an asset replacement strategy for 33kV OHL maintenance based on 3-year cycle of Target Asset replacement (TAR) which included tree-cutting and minor repairs in parallel with a 15 year condition based refurbishment programme. In addition where the extent of refurbishment requires lengths of line to be re-engineered this is also carried out on a condition assessment basis. We consider approach as being good practice.

BPI note UR considers the rate of re-conductoring to be excessive with an equivalent life of circa 56 years compared with DPCR5/6 lives of 66 years. Hence, we have considered lines subject to re-engineering to be amended.

Since BPI's conference call on 3rd July 2013, further correspondence from both NIE and the Utility Regulator has been issued concerning this area.

In summary, NIE has issued clarification that the proposed reengineering volumes are not proposing to reconductor the entire circuits. Analysis undertaken by the Utility Regulator's consultant (SKM) and clarification issued subsequent analysis calculate implicit lives of 65 and 60 years for 33kV and 11kV lines respectively and reached agreement that this is in line with industry expectations .

(Reference: Issues arising from conference call between BPI & UR on Wednesday 3 July 2013, UR-72)

BPI's view is that the 'Perpetual Asset Strategy' of cyclic refurbishment driven by condition monitoring of line components is reasonable industry practice. It is worth noting that Northern Ireland has more rural network than GB, which in coastal areas do become prone to saline corrosion and hence may be likely to require some replacement prior to the nominal asset life.

BPI hence conclude the initial DPCR 5 modelling may not yield the best result for the overhead line network, and NIE's requested overhead line asset replacement programme should be delivered under RP5.

Tree Cutting:

From the information provided on tree cutting (specifically the PB benchmarking report), NIE raise some significant concerns over the UR modelling conducted by SKM and point to issues that don't appear to have been sufficiently addressed.

"The Utility Regulator has proposed an allowance of £0.54k/km on a direct plus indirect cost basis. This is (a) less than one third of the DNO best performers; and (b) less than half of that allowed to SSE Hydro (and only 62% of SSE Hydro's direct costs allowance)."

"The benchmarking shows that NIE's direct costs per unit of work are 66% of the GB DNO average (88% on a direct plus indirect basis). Relative to the GB DNO peer group, PB considers this evidence to show that NIE's proposed costs in this respect are reasonable and that the Utility Regulator's allowance is inadequate."

Based on the initial information provided, the UR tree cutting allocation is claimed to be insufficient.

Since BPI's conference call on 3rd July 2013, further correspondence from both NIE and the Utility Regulator has been issued concerning this area.

The Utility Regulator requested that their consultant SKM to produce a tree cutting paper in order to address NIE's statement of case issues (Reference, Annex 7 A.2 (Tree Cutting Operations) dated 17th July 2013).

Key points to note are as follows:-

1. The GB DNO comparison is favourable to show relative efficiency of NIE, but a better comparison is ESB (Republic of Ireland RoI) due to its closer match to NIE.
2. The reference to total circuit length (overhead & underground cable) is a late amendment error and has been corrected to reflect DSO costs of €119/km/year and not €107/km/year. Regardless of this, the underlying conclusion of GB not being comparable with DSO remains unchanged.
3. The subsequent SKM analysis shows costs of €251/km (GB DNO) and €119/km (RoI DSO) - roughly less than half.
4. SKM point out a key difference of NIE using a largely in house tree cutting team (30 patrollers and 50 tree cutters and specialist contractors) where RoI use competitive tendered work to contractors.

The Utility Regulator concludes that the key difference in costs is explained by:

A) difference in tree cover (NI 6% Vs. UK 11.8%);

B) partly explained by GB ESQCR related increased tree cutting requirements

C) more efficient working practices of using competitive local contractors on an on-going basis.

On this basis a 33% saving has been factored in the RP5 tree cutting allowances.

BPI agree with the analysis indicating that GB DNOs are not to a like-for-like comparator with NIE and the information showing ESB RoI to be a closer match. The ESB RoI comparison would remove the GB ESQCR and largely the GB the tree cover differences and narrow down the difference closer to varying efficiencies in tree cutting practices of RoI and NIE.

BPI considers it reasonable for the Utility Regulator to drive efficiency toward a peer Network Operator similar to ESB RoI and hence do not consider an efficiency reduction unreasonable.

BPI has not been provided with UR's workings for the savings expected in tree cutting.

On the basis of the aforementioned information and for transparency we have made the following calculation:

Ratio of RoI to GB costs (€) = 119/251=0.4741

Applied to Average DNO comparison (on a direct plus indirect cost basis) (Ref NIE PB Benchmarking report (Annex 7A NIE Statement of Case) = 2.22x0.4741=1.0525 k£/km

1.0525/NIE Request 1.36 = 0.7739 or 0.2261 (22.61%) reduction on NIE Request

NIE has provided the following forecast on tree cutting costs in response to the Utility Regulators questions (Ref Spread Sheet UR67, Cell G/64), which BPI have applied the reductions to as follows:

11kV – 20800km @ £1k = £20.8m x 0.2261 =£4.7021m reduction to apply

33kV – 5180km @ £600 = £3.1m x 0.2261 = £0.7009m reduction to apply

LV – 3800km @ £1500 = £5.7m x 0.2261 = £1.2888m reduction to apply

Transmission - £1.49m x 0.2261 = £0.3390m reduction to apply

Conclusion

BPI support NIE's 'Perpetual Asset Strategy' and have allowed the original NIE Request less the efficiency expectation of the regulator. BPI view is that scope exists for tree cutting economies to be achieved and a reduction has been applied for this in the allowances.

Since the final report was published for review, NIE have proposed an alternative adjustment because the benchmark costs used in the above calculation included overhead costs as well. As the fixed Overhead Line overhead costs have not been allowed adjustment proposed by BPI is in effect double counting. Hence the reduction in OHL has been reduced to 10.81% as proposed by NIE.

ATTACHMENT 4 – List of documentation reviewed by BPI

BPI Documents List
Visit to NIE (June 2013) Documentation Tour guide
NIE Business Questionnaire NIE BPQ
Competition Commission Initial Analysis 013a – 013b – UR25 – PDF Docs NIE Capex short fall analysis by project Summary of differences Spreadsheet
Information for NIE in response to BPI Questions NIE Strategy Papers NIE Asset Management Strategy & Policy 111209 Business Case 130128 UR final Approval Spread Sheets – Project Papers June 26, Network Statistics and Age Profile June 2013, index of follow up drawings CML CI – xls (Spread Sheets)
Information from UR in response to BPI Questions Documents 4.31-4.54 – Response to UR PDF Docs Spread sheets 4.32,4.33,4.52,4.10,4.20,4.25,4.42,T_REQ09 –xls (Spread sheets) UR66 – word doc Spread sheet copy of UR DB, UR41-46, Impact of change on OH Capital Index of follow up drawings, results of Ofgem DPCR5, copy of Transmission and Distribution project review – xls spread sheets PDF Docs; UR-39-50,RP5 Incentives presentation, RP5 article 15, uksi_20022665_en Project Note 2, UR36 – word documents
Regulator Disk NIE Capex database – Distribution / Transmission UR37, UR38 UR34,UR40 – guidance documents UR36 Response to CC
Statement of Case NIE SoC (Statement of Case) (Non confidential version), 025 supplementary submission, UR25 –PDF Docs
Unit cost review by UR UR56 –DB extract unit costs
Northern Ireland Electricity Enquiry UR47-50, SKM UR36 Response to cc06-06-13 UR44 – Decision documentation
UR56 DB extract unit cost xls (Spread sheet)
BPI Report v1.2 (9-8-13)
UR – 95A-Transmission Projects, UR-95B – Distribution Projects UR – 95C – SKM Response to NIE Annex 5
Letter L130814 NIE Response to BPI draft findings
Appendix 1 NIE Response to BPI draft findings including appendix
UR – 106 586656 –transcript commentary UR- 107 Response to BPI NIE meeting
Summary of meeting actions 29 August Reconciliation for BPI xls
Summary of meeting actions & NIE Response 29 August corrected
Hearing Transcripts (16th August 2013 and 5th Sept 2013)

BPI Documents List
Response to UR 107 and to queries of BPI meeting of 5 Sept
UR-119 Observations on NIE T&D Paper
NIE response to UR119 - RE: NIE inquiry - capex info post BPI meeting of 5 Sept

Appendix A -Project Assessment Sheets

Transmission Projects Detailed Review

Project No	Project
T13	275kV/110kV Transformer Replacement
T14	110/33kVTransformers replacement
T15	22kV Reactor replacement
T16	Transmission Transformer Refurbishment
T21	Transmission Fault and Emergency
T22	Transmission Reactive
T23	Transmission design and consultancy
T26	Ballylumford 110kV Switchboard Replacement
T27	Airport road 110/33kV substation
T28	Ballylumford-Eden 110kV Circuit Upgrade
T29	Eden-Carnmoney 110kV Line Upgrade
T32	Dungannon Main 110/33kV substation
T33	Castlereagh-Knock 110kV Partial Cable replacement
T35	Ballylumford G5 & G6 cable Replacement
T37	Hannahstown-Lisburn 110kV Overhead Line Upgrade
T40	ESQCR (Transmission)
T41	Capitalised overheads (Transmission)

Distribution Projects Detailed Review

D6	Distribution Tower Lines
D7	33kV Overhead Lines
D8	11kV Overhead Lines
D9	LV Lines
D12	Distribution Overhead Lines Fixed Costs
D14	Primary Transformers
D15	Secondary substations
D17	Distribution Fault and Emergency
D18	Distribution Reactive
D19	Storms
D20	Distribution design and consultancy
D21	Post storm repairs
D22	Airport Road / Titanic Qtr. (Distribution)
D27	Dungannon Main 33kV Switchboard
D36	33/11kV Transformers
D43	ESQCR (Distribution)
D45	Capitalised Overheads (Distribution)
D47	Roads and Street Works - Connections
D48	11kV Network Performance
D49	Smart Grid Technology
D50	Distribution Substation Flooding Enforcement
D56	Network Resilience 25mm^2 Overhead Line

NIE TRANSMISSION PROJECTS DETAILED REVIEWS

TRANSMISSION		Project No	T13
NIE Project Title	**275/110kV Transformer Replacement**		
NIE Project Description	Replacement of 3 age expired poor condition 275/110kV 240MVA transmission transformers at Castlereagh, Coolkeeragh and Tandragee. These transformers were installed during the early 1960s and 1970s.		
NIE Project Justification	There are 16 275/110kV transmission transformers located at 8 transmission substations which between them feed all the customers in Northern Ireland. These assets are major, high risk, high cost items with associated auxiliary systems including transformer cooling plant, control and protection equipment and battery and charger equipment. Additionally, 7 of the 16 275/110kV transformers have shunt reactors and associated switchgear connected to their tertiary windings. On-going condition assessment of these assets has highlighted three units and their associated auxiliary equipment that are in most need of replacement. This programme of replacement will minimise the risk of in-service failure of these assets, which would have very serious implications for supply availability over the wider network.		
NIE Request	£7.8m		
UR Determination Findings	The UR Final Determination made an allowance for 2 Transformers and added £1.5million for condition monitoring for HV Transformers. This was based on the SKM asset lifetime model.		
BPI Assessment	According to NIE data, of its population of 275/110kV transformers, six will require replacement in the short term (RP5 and RP6) and the remainder before the end of RP7. Assuming that NIE's condition assessments are correct and that its assessment of overall risk is accepted then this level of asset replacement could be challenge to NIE in terms of procurement, lead times, project management, and system outages. It will be important then that the sequencing of the replacements is managed. Indeed, on age alone if the replacements were to move into RP8 then even that would still provide a sizeable challenge. 275/110kV transformers are high cost plant items forming an important part of the electricity infrastructure. However the level of importance is somewhat subjective for each individual unit and its position on the network. NIE uses a model based on risk of failure and consequence as explained in the main body of the report. This is then applied to a risk-ranking table and individually scored. This is generally accepted as good industry practice for managing assets and for determining an asset replacement programme. Additionally, as explained in the main body of the report, it is problematical to apply asset lifetime modelling techniques to such a small sample of strategically important assets and condition of individual items must be considered. In terms of risk of failure, the DGA results are extremely important. As well as a snapshot, the rate of change is significant in determining transformer deterioration.		

<table>
<tr><td></td><td>The NIE top four priority list for 275/110kV transformer changes is as follows:

<table>
<tr><th>Substation</th><th>Equipment</th><th>Site</th><th>Risk Ranking</th></tr>
<tr><td>Castlereagh IBT1</td><td>24</td><td>18</td><td>432</td></tr>
<tr><td>Tandragee IBT3</td><td>19</td><td>18</td><td>342</td></tr>
<tr><td>Coolkeeragh IBT1</td><td>17</td><td>20</td><td>340</td></tr>
<tr><td>Hannahstown IBT2</td><td>18</td><td>18</td><td>324</td></tr>
</table>
The Regulator has allowed Castlereagh and Tandragee but disallowed Coolkeeragh. It can be argued that the transformer at Coolkeeragh, with a lower probability of failure than that at Hannahstown, could be similarly deferred to RP6. However, taking the 275/110kV assets as a whole and recognising the future replacement needs together with NIE's accepted ranking methodology, BPI's view is that a third transformer should also be allowed.

See main report for analysis of subsequent discussion and input from UR and NIE regarding the differing approaches to asset replacement volumes.

BPI has also followed the UR's recommendation that the condition monitoring element of the Fund 3 Project Smart Grid (Project D49) should be allowed in conjunction with this project and T14.</td></tr>
<tr><td>BPI Recommendation</td><td>Replace 3 transformers. In addition, UR allowed £1.5million (50% of the total project costs) from the Smart Grid project D49 in fund 3 for condition monitoring across all the HV transformers.</td></tr>
</table>

Cost Breakdown

Item	No	Cost (£)	Total	Comments
275/110kV Transformers	3	2,602,525	7,807,575	Includes installation
Sub-total			**7,807,575**	
Technical Design and Project Management			332,567	10% reduction to requested amount and pro-rata between NIE Request and BPI assessment
Total			**8,140,142**	
Condition Monitoring (Fund 3)			1,500,000	as per Final Determination as 50% portion of Fund 3 Project D49 Smart Grid
Total inc. Fund 3			**9,640,142**	

Source:

NIE Strategy Paper B1, UR44 spreadsheet

TRANSMISSION		Project No	T14
NIE Project Title	**110/33kV Transformers Replacement**		
NIE Project Description	Replacement of eight age expired poor condition 110/33kV transmission transformers at located at four substations - Ballymena, Donegal, Enniskillen and Knock Main substations. These transformers were installed during the early 1960s and 1970s.		
NIE Project Justification	There are seventy-two 110/33kV transmission transformers located at 32 transmission substations. These assets are major, high risk, high cost items with associated auxiliary systems including transformer cooling plant, control and protection equipment and battery and charger equipment. On-going condition assessment of these assets has highlighted eight units and their associated auxiliary equipment that are in need of replacement. This programme of replacement will minimise the risk of in-service failure of these assets which would have very serious implications for supply availability over the wider network.		
NIE Request	£10,693,232		
UR Determination Findings	NIE proposal not supported by asset modelling. SKM asset modelling of GB DNO equipment suggests a longer predicted asset life. Replacement of two transformers plus additional condition monitoring allowed for in FD. UR has proposed the replaced transformers could be used as spare.		
BPI Assessment	The key aspect of this project is the comparison of condition monitoring coupled with risk assessment with predictive lifetime asset modelling. NIE uses a model based on risk of failure and consequence as explained in the main body of the report. This is then then applied to a risk-ranking table and individually scored. This is a generally accepted as good industry practice for managing assets and for determining an asset replacement programme. Additionally, as explained in the main body of the report, it is problematical to apply asset lifetime modelling techniques to such a small sample of strategically important assets – age and condition of individual items must be considered. This is also a well adopted approach but does allow some room for interpretation. The highest priority transformer, Donegal Main Transformer, has a combined score of 300. The next 5 have a score of between 261 and 264. In terms of risk of failure, the DGA results are extremely important. As well as a snapshot, the rate of change is significant in determining transformer deterioration. Based on the supporting information provided it is BPI's view that to only replace two transformers does not take account of the local knowledge and risk factors as well as the critical nature of these assets within the overall network. The scores of the highest priority transformers are very close and it would be difficult to isolate the second priority transformer after the highest priority as the needs and risks are similar. From the information provided, it is BPI's view that there are six transformers which score the highest risk score and are candidates for replacement in RP5, of which two (Knock Main) hold the highest equipment probability (Reference NIE Strategy Paper B2, Figure 2). The body of the report includes an assessment of subsequent discussion and input from		

	UR and NIE regarding the differing approaches to asset replacement volumes. Additionally, we have reviewed NIE's approach to the provision of a spare transformer and in particular its subsequent comments to clarify that the proposed spare will be one of the eight purchased on a rolling basis until the end of RP5 when the spare will then move into RP6. Considering the evidence provided both before and subsequent to our draft report, BPI recommends that there should be an allowance for the purchasing of six transformers but for the installation of five only. This is in line with our original recommendation but we now believe that the unit regarded as a spare will be installed in the next review period. BPI does not believe this strategy will increase NIE's network risk. BPI has also followed the UR's recommendation that the condition monitoring element of the Fund 3 Project Smart Grid (Project D49) should be allowed in conjunction with this project and T13.
BPI Recommendation	Provide funding for 6 replacement transformers. In addition, UR allowed £1.5million (50% of the total project costs) from the Smart Grid project D49 in fund 3 for condition monitoring across all the transformers.

Cost Breakdown

Item	No	Cost (£)	Total	Comments
110/33kV transformers	6	700,000	4,200,000	Substations included:- Donegal TXD & TXA Ballymena Main TX3 & TX4 Knock Main TXA & TXB (Reference NIE Strategy Paper B2, Figure 2).
Installation cost	5	192,904	964,520	
Cables	5	356,200	1,781,000	
Sub-total			**6,945,520**	
Technical Design and Project Management			296,248	10% reduction to requested amount and pro-rata between NIE Request and BPI assessment
Total			**7,241,768**	
Condition Monitoring			1,500,000	as per Final Determination as 50% portion of Fund 3 Project D49 Smart Grid
Total (inc. Fund 3)			**8,641,768**	

Source: NIE Strategy Paper B2, UR44 spreadsheet

TRANSMISSION		Project No	T15
NIE Project Title	**22kV Reactors Replacement**		
NIE Project Description	Replacement of age expired poor condition 22kV reactors, which are located at Castlereagh, Kells and Tandragee 275/110kV substations. These reactor transformers were manufactured during the 1960s and early 1970s. In addition, one unit will be purchased to provide spares coverage.		
NIE Project Justification	There are seven 22kV transmission reactor transformers located at four transmission substations. The reactor transformers are connected to the tertiary winding of a number of 275/110kV transformers to provide reactive power compensation. On-going condition assessment of these assets has highlighted four units and their associated auxiliary equipment that are in need of replacement. This programme of replacement will minimise the risk of in-service failure of these assets, which would have very serious implications for voltage control on the network.		
NIE Request	£3,669,880		
UR Determination Findings	The draft Determination allowed for replacement of three reactors according to UR44. Although the notes suggest one spare should be procured in RP5 for future replacement in RP6. This was based on only replacing the three oldest reactors installed in 1965. This was then adjusted for the Final Determination on basis of asset age profiling by SKM to one reactor.		
BPI Assessment	This is a very similar case to Transformers. The asset survivor profiling results in only one replacement whereas risk scoring plus condition assessment highlights a greater number. As explained in the main body of the report, it is problematical to apply asset lifetime modelling techniques to such a small sample of assets – age and condition of individual items must be considered. Reactors are a critical element in maintaining voltage levels and the very nature of their purpose requires a reactor to be operating at full load for most of its life. NIE also point out that the reactors are outside in switch yards and are exposed to a harsh maritime environment which increases corrosion of external parts although it is the internal components that are obviously more critical. Many reactors are now placed inside some form of building for protection and noise abatement reasons. From our experience the 6 months' lead time quoted in the submission is optimistic and could be up to 12 months. Also the expected life of such equipment is quoted by suppliers at 30-40 years. See main report for analysis of subsequent discussion and input from UR and NIE regarding the differing approaches to asset replacement volumes. BPI has now reviewed the evidence provided both before and subsequent to our draft report, Notwithstanding our original view, we are now minded to change our recommendation for this particular asset group. However, it must be stressed that our new recommendation is based not on a change of opinion with regards to asset replacement methodology but rather a different conclusion to NIE's risk scoring. BPI's recommendation is now for the replacement of one reactor at Castlereagh but with the provision of a spare which can be moved into RP6. We have assumed that the replaced reactors would serve little purpose to be redeployed although there may be some value for spare parts for the other older reactors until their time comes to be replaced.		
BPI Recommendation	Replace one reactor, and order one spare.		

Cost Breakdown

Item	No	Cost (£)	Total	Comments
22kV Reactor	2	650,000	1,300,000	
Installation cost	1	105,000	105,000	
Sub-total			**1,405,000**	
Technical Design and Project Management			59,928	Pro-rata PM and consultancy request reduce by 10% efficiency factor
Total			**1,464,928**	

Source:

NIE Strategy Paper B5

UR44 spreadsheet

TRANSMISSION		Project No	T16
NIE Project Title	**Transmission Transformer Refurbishment**		
NIE Project Description	Replacement and refurbishment of defective transformer and disconnector components.		
NIE Project Justification	This project covers the replacement and refurbishment of defective transformer and disconnector components which are not otherwise catered for in the asset replacement programme. There is also a requirement for strategic spares and on-line monitoring equipment to facilitate the on-going reliable operation of aged and poor condition equipment. Condition assessment of transmission assets has highlighted the need to carry out minor type refurbishment works associated with particular items of equipment e.g. 275kV and 110kV bushings, 275kV Disconnector, cooler replacement and painting. This programme of replacement and refurbishment will extend the overall asset life and minimise the risk of in-service failure of these assets, which would have very serious implications for the wider network.		
NIE Request	£1,152,000		
UR Determination Findings	Insufficient detail on failure history or condition assessment provided was the response in the Draft Determination and a 66% reduction in proposed project costs. This was further reduced to zero during the Final Determination on the basis that these costs were covered in asset replacement projects – T13 and T14 and in reactive, fault and emergency work (T21 and T22)		
BPI Assessment	NIE have laid out a definitive set of items to be included in the scope of work which includes bushings and tap changers which are common items for repair as well as some painting and maintenance. The target transformer and substations needs to be confirmed. Although the project description includes on-line monitoring there is no specific line item or breakdown for this facility which has already been included in some other projects. There is no specific condition assessment supporting the choice of items and locations but this covers a large number of items and it is the older substations that have been identified. BPI's view is that it is likely that these items are necessary and NIE are demonstrating proactive planning and so these items should be excluded from reactive or fault budgets. There are some overlaps with site identified in T13 and T14 but we believe that the scope of the transformer projects excludes these items.		
BPI Recommendation	BPI believes these are essential items and the full allowance of £1,152,000.		

Cost Breakdown

Item	No	Cost (£)	Total(£)	Comments
275kV Bushing Refurbishment	8	45,000	360,000	
275kV Plant Painting	4	12,500	50,000	
275kV Disconnector Refurbishment and Spares			100,000	
275/110kV TX Tap Changer refurbishment	6	40,000	240,000	
110kV Cooler Replacements	2	50,000	100,000	
110kV Bushings Replacement	7	16,000	112,000	
110kV Plant Painting	10	8,000	80,000	
110kV Disconnector Refurbishment and Spares	1		50,000	
110/33kV TX Tap Changer refurbishment	4	15,000	60,000	
Sub-total			**1,152,000**	
Pro-rata Technical Design and Project Management			49,136	
Total			**1,201,136**	

Source:

NIE Strategy Paper B6

UR44 spreadsheet

TRANSMISSION		Project No	T21
NIE Project Title	**Transmission Fault and Emergency**		
NIE Project Description	This investment provision is for capital work on plant and equipment following faults on the 275kV and 110kV networks.		
NIE Project Justification	Each year, the transmission network experiences a number of overhead line, cable, plant and equipment failures and damage due to vandalism or damage due to inclement weather. The restoration of the network following such failures requires the repair and early replacement of assets. The investment level proposed for RP5 reflects RP4 expenditure level outturn for post fault repairs and replacement on transmission plant and circuits.		
NIE Request	£4,135,799		
UR Determination Findings	We have accepted NIE's claim for these costs in full, based on historic run rate. We have made an adjustment of 10% to the indirect costs. Given the increase in planned programmes, the volume of faults should decrease towards the end of this period and into RP6.		
BPI Assessment	Although fully agreed by the Regulator, BPI has reviewed Projects T21 and T22 because of representations made by the Regulator in view of our recommendation to increase the RP5 capex for certain asset replacement categories. The Regulator was very clear that in their opinion the capex allowed in both T21 and T22 is effectively a contingency sum and should be regarded as such when analysing overall asset replacement expenditure. This assessment was stated as part of the Regulator's comments in the final determination, viz "no increases in asset replacement spend allowed, therefore this expenditure allowed." The inference is that for additional expenditure for transmission asset replacement then there should be a reduction within this category. NIE provides a list of examples of capitalised post fault repairs for that period. E.g. Plant: • Tandragee 110kV S/S - replacement of VT after failure • Rathgael 110/33kV transformer – bushing failure resulting in irreparable damage to the transformer and hence transformer replacement • Castlereagh – CT replacement due to leak • General – 5 disconnector replacements following catastrophic failure at 2 sites Cables: • Castlereagh to Rosebank 110kV – catastrophic joint failure resulting in replacement of cable section • Ballylumford Power Station T2 – work to cable sealing ends following abnormal test results • Donegal to Hannahstown – emergency oil leak repairs We note there may be on-going discussions regarding capitalisation policy but BPI's brief does not cover opex so this assessment, by necessity, accepts this spend as capex.		

	The transmission fault and emergency allowance is based on the RP4 run rate and is for the replacement or refurbishment of assets under essentially emergency circumstances. This covers the failure of equipment, including plant, cables and overhead lines caused by damage faults occurring on the system. By definition these are unforeseen events and will be caused by inclement weather, vandalism, and damage or plant deterioration. However, reviewing the examples of work carried out under this category in RP4, the replacement of the 110/33kV transformer at Rathgael is one incident that is likely to be avoided if an increase in the number of these assets to be replaced in RP5 is allowed (NIE within their asset management procedures to determine transformer replacement requirements state bushing condition is one of the important considerations and inputs). BPI's recommendation is that the requested expenditure based on the RP4 run rate should be reduced by an amount equivalent to the cost of the transformer installation at Rathgael – assuming a new transformer then this will be £1,249,100
BPI Recommendation	Full allowance less the transformer cost for Rathgael

Cost Breakdown

Item	No	Cost (£)	Total	Comments
Project costs			£4,135,799	
Remove allowance for Rathgael Transformer	1	£1,249,100	-£1,249,100	Remove item
Total			**£2,886,699**	

Source:

NIE

UR44 spreadsheet

TRANSMISSION		Project No	T22
NIE Project Title	**Transmission Reactive**		
NIE Project Description	The Investment plan includes a category of expenditure which is reactive to unplanned events or is as a result of unanticipated defects or failures which subsequently drives follow up programmes of refurbishment or replacement. It is required to be delivered in addition to the existing planned work programmes.		
NIE Project Justification	This reactive investment can either: • result in a new programme of work on assets not previously identified for investment during the period; • relate to assets which have failed early; • result in an interim refurbishment programme until a full replacement programme address the requirements in full; or The investment level proposed for RP5 reflects RP4 level outturn experience on a range of reactive investments including voltage transformer failures, bushing failures and circuit breaker failures.		
NIE Request	£722,524		
UR Determination Findings	We have accepted NIE's claim for these costs in full, based on historic run rate. We have made an adjustment of 10% to the indirect costs. Given the increase in planned programmes, the volume of faults should decrease towards the end of this period and into RP6.		
BPI Assessment	Although fully agreed by the Regulator (less an efficiency factor) BPI has reviewed Projects T21 and T22 because of representations made by the Regulator in view of our recommendation to increase the RP5 capex for certain asset replacement categories. The Regulator was very clear, that in their opinion, the capex allowed in both T21 and T22 is effectively a contingency sum and should be regarded as such when analysing overall asset replacement expenditure. Generally, we note there may be on-going discussions regarding capitalisation policy but BPI's brief does not cover opex so this assessment, by necessity, accepts this spend as capex. This assessment was stated as part of the Regulator's comments in the final determination, viz "no increases in asset replacement spend allowed, therefore this expenditure allowed." The inference is for additional expenditure for transmission asset replacement then there should be a reduction within this category. NIE provides a list of examples of capitalised refurbishment or replacement works which are unforeseen or reactive in nature. The work relates to minor items of plant including civil structures, auxiliary equipment and security. Examples provided include; • S/S gate replacement • S/S air conditioning refurbishment • S/S security enhancements • S/S battery charger replacement • 275kV disconnector - programme following fault (detail not provided) • Ballylumford 275kV bushings (detail not provided)		

	NIE will have a number of reactive items registered during the course of any year. It will be necessary to deal with a proportion of these relatively quickly, particularly any that impact upon safety or customer supplies, and some will be deferred and included within programmed replacement works. However, within the list of examples provided by NIE there some that we believe will be captured within programmed asset replacement works rather than the reactive pot e.g.: • Replacement of S/S earthing • Replacement of transformer hot tails (cables with degraded insulation) • Kilroot 275kV wall bushing refurbishment Although, for example, the replacement S/S earthing may be due to vandalism or theft, it would not seem unreasonable to assume that others, such as replacement of degraded transformer tails, should be foreseen and will therefore be included within the programmed works. BPI's recommendation is that this expenditure, based on the RP4 run rate, should be reduced due to our recommended increases in transmission asset replacement. We believe a reduction of £200,000 is reasonable given the overall capex increase.
BPI Recommendation	£522,524

Cost Breakdown

Item	No	Cost (£)	Total	Comments
Project Costs			£522,524	Remove £200,000 from request.
Total			**£522,524**	

Source:

NIE

UR44 spreadsheet

TRANSMISSION		Project No	T23
NIE Project Title	Transmission Design and Consultancy		
NIE Project Description	This investment category covers for the direct cost associated with Transmission substation design and project management of capital projects and for certain projects, the use of specialised substation design consultancy.		
NIE Project Justification	This investment category covers for the direct cost associated with Transmission substation design and project management of capital projects and for certain projects, the use of specialised substation design consultancy.		
NIE Request	£5,338,879		
UR Determination Findings	In response to our follow up questions, NIE provided a breakdown of this request by project/programme. We have allocated these costs to the individual projects and have included the associated design and consultancy costs along with the projects. This provides NIE with the flexibility to choose between internal and external resources.		
BPI Assessment	The capital expenditure programme was subject to benchmarking exercise undertaken by PB Power and Frontier Economics. These studies were commissioned by NIE and were reviewed by SKM and CEPA acting on behalf of UR. UR's approach to these costs was to include them with the projects to which they relate and we are in agreement with this approach. There remains a lack of clarity about the comparability of NIE's costs and benchmark data, particularly with the use of Power team rates and we understand that a benchmarking exercise is being undertaken to consider the efficiency of NIE's indirect costs. As these costs relate to specific projects we believe that they are variable in nature and can be adjusted according to the size of the capital programme.		
BPI Recommendation	The requested project management and consultancy costs have been included in the individual projects and pro-rata with the overall project cost. The table below summarises the position across all the projects.		

Project Management and Consultancy Costs

		NIE Request	BPI Recomm.
		£m	£m
Transmission			
	Asset replacement	2.52	2.27
	Load related	1.58	1.18
	sub-total	**4.10**	**3.44**
Distribution			
	Asset replacement	5.32	5.25
	Load related	1.14	0.94
	sub-total	**6.46**	**6.19**
Fund 3 and Other Projects		1.45	1.37
TOTAL		**12.01**	**11.01**

TRANSMISSION		Project No	T26
NIE Project Title	Ballylumford 110kV Switchboard Replacement		
NIE Project Description	The project is to establish a new GIS switch house and a 40kA GIS double busbar switchboard with 12 outgoing circuits, a busbar section switch and a busbar coupler. The circuits connected to the existing double busbar will be diverted with cable to the new GIS switchboard. The existing switchboard will be decommissioned and removed. The existing switch house will also be removed.		
NIE Project Justification	Under normal system configuration and high levels of generation the fault rating of the 110kV double busbar arrangement at Ballylumford can be exceeded. The system is operated with an abnormal configuration, usually a 275/110kV interbus transformer out of service, to manage the fault level to a safe level. The plant is now obsolete with spares limited and there have been some reliability issues. The building is also in poor condition. It has been recommended that due to health and safety concerns associated with in situ replacement, a new offsite switchboard and house is the only feasible option. The project must be started in RP4 and completed in the early years of RP5 due to the increase in fault level and condition based risks.		
NIE Request	£15,270,000		
UR Determination Findings	The need for this work has been clearly established, alternative options have been considered and the cost of the work justified. We have therefore included this cost in full. Consultancy costs have been incurred during RP4 and none were identified for RP5.		
BPI Assessment	The 110kV double busbar arrangement at Ballylumford Power Station provides a connection from the 275kV busbar and the large CCGT generators to the four outgoing 110kV circuits that are important to the export capacity and supply to Eden and Carnmoney 110/33kV bulk supply points. The busbar also connects three station transformers for the B station and CCGT10. Also connected are two 60MW GTs. The switchboard is a Reyrolle design with OBYR14 circuit breakers. This switchgear is now regarded as obsolete, there are supply issues around spare parts and there have been some reliability issues. Under normal system configuration the fault rating of the 110kV double busbar arrangement at Ballylumford can be exceeded. Safe operation of the circuit breakers can only be achieved by abnormal operation of the network by SONI The system is operated with an abnormal configuration, usually a 275/110kV interbus transformer out of service, to manage the fault level. Additionally the building, constructed of a steel frame with corrugated cladding, is also in poor condition. The cladding sheets are severely corroded but replacement is difficult due to the proximity of live switchgear. The use of asbestos impregnated paint in the past on the panels also presents a problem due to the potential release of particles onto the switchgear. During the course of RP4, NIE engaged PB Power to carry out an investigation into the refurbishment options of the 110kV switchgear. PB Power reported in March 2009 and strongly advised against attempting to refurbish the switchgear and switch house in situ mainly due to the health and safety risks involved. PB Power also advised that the preferable option would be to construct a new GIS switchboard off site and transfer the 110kV circuits by cable. This would allow the decommissioning and demolition of the existing switch house in a safe manner.		

	Because of increased fault levels the rating of this switch gear will continue to be an issue. Although SONI is able to manage this by running the system abnormally, this is not desirable and should be regarded as a temporary measure rather than a solution (although a reduction in generation capacity may ease the situation this is unlikely in the medium term). This, together with the other factors including age, the question of spare parts and reliability, provide a very strong case for replacement. Additionally, there are major safety issues that will have to be addressed if the existing building is to be utilised to allow replacement in situ. BPI agrees that the need for this work has been clearly established. Further, because of network configuration, we do not see any reasonable possibility of reducing the number of breakers to be installed and agree on the scope as presented by NIE. The safety issues presented by the existing building rule out any kind of refurbishment strategy and the construction of a new GIS switchboard remote from the existing board would seem the best option. NIE planned to spend £270k in RP4 for upfront design work. The remainder, costed by PB Power at £14.707m (excluding project management), is planned for RP5. This is a large project and the final outturn will be dependent upon tendered prices and overall contract management. However, a comparison with similar projects would indicate that £14.707m is a reasonably accurate figure prior to tender BPI Conclusion: Although this project has been allowed by the Utility Regulator. BPI was requested to provide our independent opinion on this project. As justified above we find this expenditure as necessary for Review Period 5. It should however be noted that it is not clear what stage this project is now at - if the tender process has been completed then the allowance can be adjusted accordingly.
BPI Recommendation	Provision for new 110kV switchboard

Cost Breakdown

Item	No	Cost (£)	Total	Comments
110kV switchboard	1	13,017,000	13,017,000	
Installation cost	1	1,690,000	1,690,000	
Project Management			651,313	
Adjustment for 10% efficiency on indirect costs			0	
Total			**15,358,313**	

Source:

NIE Strategy Paper A1

UR44 spreadsheet

TRANSMISSION		Project No	T27
NIE Project Title	**Airport Road (Titanic Quarter) new 110/33kV Substation**		
NIE Project Description	It is necessary to construct a new 110/33kV substation at Airport Road to supply increased demand in the Titanic Quarter and Harbour Estate. The transmission part of the project includes the installation of a pair of 90MVA 110/33kV transformers. These will be connected by re-energising the existing Rosebank Main to Dee Street 110kV tower line. This will involve establishing 110kV switchgear at Rosebank Main and a section of duplicate 110kV cable circuits from the Dee Street terminal tower to the new transformers.		
NIE Project Justification	Significant demand growth has been forecast in the Belfast Harbour area due to the Titanic Quarter redevelopment, Bombardier and Belfast Harbour Commissioner proposals. The existing 33kV network in the area has been developed to its maximum potential. To cater for the level of demand growth it is necessary to further develop the network with the introduction of a new 110kV injection point.		
NIE Request	£3,980,000		
UR Determination Findings	We are satisfied that the project will proceed in RP5, but there is a risk that the work will be completed in RP6 along with questions outstanding over customer funding contribution. RP5 allowance 50%.		
BPI Assessment	The Strategy Paper outlines possible technical options and the need for the project to support future growth in a redeveloped part of the city. There are still some doubts about timing of demand and confirmation from prospective developers and perhaps some of the doubt, which NIE recognise, seems to hinge on the potential connection cost of being the first development and taking on a disproportionate amount of the overall cost. It might be fairer to find a method to split the costs over more potential customers. In addition during the recent discussions the UR mentioned the possibility of a CHP plant being built in the vicinity. According to NIE this would not affect this particular project as it would not avoid the investment in this element of the network There is little doubt from UR that this project should go ahead and it seems to be a matter of timing. BPI believes that the 50% does not reflect the project cost breakdown with at least £1.8m required for Transformers alone. It is our recommendation to allow the full project amount in RP5 subject to confirmation from NIE that the demand is still justified and that the whole project can be completed within the period.		
BPI Recommendation	Allow full project cost £3,980,000		

Cost Breakdown

Item	No	Cost (£)	Comments
Tee off switchgear Rosebank	2	900,000	Source NIE Strategy Paper A1
110v Cabling from Dee Street tower to 110/33kv TX	2	1,200,000	Source NIE Strategy Paper A1
Extend compound		100,000	Source NIE Strategy Paper A1
Install 2 110/33kv TX	2	1,780,000	Source NIE Strategy Paper A1
Sub-total		**£3,980,000**	Total
Project Management and Technical Consultancy		**169,760**	
Total		**4,149,760**	

Source: NIE Strategy PaperA1

TRANSMISSION		Project No	T28
NIE Project Title	**Ballylumford-Eden 110kV Circuit Upgrade**		
NIE Project Description	The project is to replace the existing conductor on the 15km Ballylumford – Eden double circuit tower line. The new conductor should be rated at least 150MVA. This project is intended to cater for the generation at Ballylumford Power Station and the Moyle Interconnector. This project is one part of two projects with Project T29 which together replace this stretch of line.		
NIE Project Justification	The above circuits are part of an important 110kV link from Ballylumford Power Station through to Castlereagh 275/110kV grid supply point. The Ballylumford – Eden circuits can be overloaded for the loss of the Hannahstown to Ballylumford / Moyle double circuit tower line in winter. The level of overload would cause the remaining circuit to trip and by removing a vital route for power flow into Belfast contribute to the voltage regulation issues. There are other scenarios which cause this circuit to overload.		
NIE Request	£2,310,000		
UR Determination Findings	Questions remain over the need for the project, particularly given confirmed decommissioning of the Ballylumford B generating units and the reduction in Moyle capacity. Additionally, although the line is fairly old, information provided by NIE suggests that it is in relatively good condition. Recommendation is zero allowance but logged up if credible outage conditions demonstrate project need and greater system risk than already managed.		
BPI Assessment	This project is linked to Project T29 which is the other part of the line. It is clear that the load forecasts are uncertain as there are still some doubts about both Ballylumford Power Station and the Moyle interconnector. Indeed, project need is directly linked to the future generation at Ballylumford and import capacity on the Moyle interconnector, both of which seem somewhat uncertain at present. Also we do note that the existing conductors were installed in 1943 but are still in good condition and hence this project was not included within asset replacement. We also note that risks associated with circuit outages are currently being managed. Having reviewed the available data BPI believes that there are too many uncertainties, particularly with regard to Ballylumford and the Moyle interconnector, to allow this project in Fund 2 and therefore recommends no allowance in RP5.		
BPI Recommendation	No allowance in RP5		

Source:

NIE Strategy Paper A1

TRANSMISSION		Project No	T29
NIE Project Title	**Eden Carnmoney 110kV Line Upgrade**		
NIE Project Description	The project is to uprate conductor to establish a rating above 150MVA.		
NIE Project Justification	The above circuits are part of an important 110kV link from Ballylumford Power Station through to Castlereagh 275/110kV grid supply point. The Eden - Carnmoney A & B circuits have a relatively low rating of 69MVA in summer. The circuits can be overloaded for the loss of the Hannahstown to Ballylumford / Moyle double circuit tower line in winter. This level of overload could cause the remaining circuit to trip and by removing a vital route for power flow in Belfast contribute to the voltage regulation issues. There are other scenarios which cause this circuit to overload.		
NIE Request	£2,300,000		
UR Determination Findings	This project is linked to Project T28, the other half of the circuit. The Determination applies to both projects.		
BPI Assessment	This project is linked to Project T28 which is the other part of the line. It is clear that the load forecasts are uncertain as there are still some doubts about both Ballylumford Power Station and the Moyle interconnector. Indeed, project need is directly linked to the future generation at Ballylumford and import capacity on the Moyle interconnector, both of which seem somewhat uncertain at present. Also we do note that the existing conductors were installed in 1943 but are still in good condition and hence this project was not included within asset replacement. We also note that risks associated with circuit outages are currently being managed. Having reviewed the available data BPI believes that there are too many uncertainties, particularly with regard to Ballylumford and the Moyle interconnector, to allow this project in Fund 2 and therefore recommends no allowance in RP5.		
BPI Recommendation	No allowance in RP5.		

Source:

NIE Strategy Paper A1

TRANSMISSION		Project No	T32
NIE Project Title	**Dungannon Main,110/33kV Substation**		
NIE Project Description	The transmission element of the project is to install 2 additional 110/33kV transformers. The distribution part includes the installation of a new 8 panel 33kV switchboard. The five 33kV circuits north to Cookstown will be diverted into the new 33kV switchboard thus relieving the existing substation and providing additional security of supply.		
NIE Project Justification	Dungannon Main 110/33kV bulk supply point (BSP) supplies almost 38,000 customers in the large mid Ulster towns of Dungannon and Cookstown 15km to the north. The 110/33kV substation supplies 14 individual 33/11kV substations three of which are dedicated for supply to important manufacturing and food industries. The BSP has 2 x 90MVA transformers and a matched 33kV switchboard. The demand on the substation is forecast to reach 105MVA by 2016/17. For a single circuit outage however the transformer would be loaded to its firm capacity of 117MVA (i.e. Its 30% cyclic overload rating) taking account of losses. A second issue at Dungannon Main is that for the loss of both transformers, for example a maintenance outage followed by a forced outage, there is insufficient capacity in the interconnected 33kV network to provide the minimum level of resupply required by the licence standards		
NIE Request	£2,360,000		
UR Determination Findings	This project is not justified under the P2/5 Security Standard. We have not seen the evidence of poor voltages to compare against the voltage standards. The growth forecast is yet to materialise based on 2011 and 2012 statistics.		
BPI Assessment	BPI notes the work carried out by SKM and in particular its conclusions that Dungannon does not currently contravene the P2/5 security standard. Additionally we agree that the load growth predictions are somewhat problematical - indeed NIE agree that the (n-1) scenario is unlikely to be an issue and state that an (n-2) scenario is credible in order to justify the work in RP5. BPI believes in this case that an (n-2) scenario is not credible and further, from our experience of work within the GB DNOs, we believe it extremely unlikely that this project would proceed on the basis of the available data. This is reinforced if the risk and criticality data of the transformers within the asset management plan is also taken into account This project is linked to D27 – the associated 33kV switchboard		
BPI Recommendation	No allowance in RP5		

Source:

NIE Strategy Paper A1

UR44 spreadsheet

TRANSMISSION		Project No	T33
NIE Project Title	**Castlereagh-Knock 110kV Partial cable Replacement**		
NIE Project Description	The project is the partial replacement of 110kV duplicate cables from Castlereagh – Knock. In RP5 it is planned to replace the section from Castlereagh to the start of the Braniel Road, approximately 1.8km. This project could be combined with the similar scheme to replace the Castlereagh to Rosebank 110kV cables.		
NIE Project Justification	The replacement of the above cables is required as the fault level now exceeds the through fault rating of the cables under certain circumstances. In the 45 years since these cable circuits were installed, the fault level has increased significantly due to the installation of additional generators, transformers, and circuits. There is now a risk that a fault coupled with a slow protection clearance could cause irreparable damage to the cables. This project is the replacement of the first section, 1.8km, from Castlereagh substation - Braniel Road. During RP5 it will also be necessary to replace a section close to Knock substation, as part of the project to replace the transformers at that site. In addition the Department of Regional Development Road Service have road development proposals along this route. Plans will not be put in place until further information and firm plans are in place from Road Service. For the above reasons and to spread the significant cost it is therefore planned to phase the replacement over two periods. To manage the risk during this period it is proposed to modify the protection on the circuits to minimise the risk of a slow protection clearance.		
NIE Request	£1,600,000		
UR Determination Findings	The UR revised the Draft Determination to allow the costs for protection and 50% of the cable costs.		
BPI Assessment	There is no doubt as to the need to conduct this project as fault levels have exceeded the through fault rating of the cables. A major issue is the adequacy of the sealing ends at Castlereagh. Additionally these oil-filled cables are over 45 years old and will continue to be an ever growing environmental problem into the future. However, we also note the issues surrounding the A55 road development proposals and the impact these could have on any proposed cable works. Consequently, BPI believes there is a good case to replace the cables over at least the 1.8km section from Castlereagh to Braniel. Additionally we support the proposed protection modifications to reduce the possibility of damaging slow clearance times in the event of a fault. It is not at all clear as to how the Regulator has arrived at the Final Determination of £924,165. Possibly there may have been a misunderstanding of the scope of works – UR may wish to confirm its determination. In any case BPI still recommends the replacement of 1.8km.		
BPI Recommendation	Allow for cable replacement over a route length 1.8km and associated network protection scheme.		

Cost Breakdown

Item	No	Cost (£)	Total(£)	Comments
Total for cable works and protection scheme			1,600,000	No detailed breakdown given by NIE.
Technical Design and Project Management			68,245	As requested by NIE with 10% efficiency factor applied
Total			**1,668,245**	

Source:

NIE Strategy Paper A1

UR44 spreadsheet

TRANSMISSION		Project No	T35
NIE Project Title	**Ballylumford G5 and G6 Cable Replacement**		
NIE Project Description	The G5 and G6 generator cables run from the 275kV circuit breakers in the 275kV switch house to the generator transformer compounds. They are located in cable tunnels. The project will involve the disconnecting and removal of the existing fluid filled cables and the installation and connection of new XLPE replacement cables in the tunnels		
NIE Project Justification	In January 2003 the Ballylumford G4 generator transformer cable termination failed in service. The failure caused damage to adjacent cable terminations, the generator transformer bushings and earthing switch phase insulators. Some damage was also caused to the compound. As a result of condition assessment the G4 275kV cable was replaced. Generators G5 and G6 are supplied by similar 275kV cables and terminations. These cables were also technically assessed and whilst there was some degradation, at a lower level, this risk was considered manageable in the medium term through on-going assessment and use of personnel exclusion zones. At the time of the fault on G4 cable, these generators were expected to retire in 2006 but are now not likely to retire before 2016, after which their future is linked to emissions policy. Recent partial discharge tests on the terminations at the G5 generator transformer have indicated partial discharge and heating identified by infra-red monitoring. The G5 cable also has considerable fluid leaks. It is not now considered sustainable to continue the regime of exclusion zones with condition assessment and it is therefore proposed that the cables for G5 and G6 must be replaced.		
NIE Request	£1,600,000		
UR Determination Findings	If Ballylumford generators G5 and G6 are to be decommissioned in 2016 due to emissions restrictions then replacing the 275 kV cables now seems expensive, particularly given that the project won't be completed until mid-2013 at the earliest at which point they will have less than 3 years to run Recommendation is zero allowance and continuation of present operational restrictions and exclusion zone unless NIE can demonstrate that these mitigation measures (which they have implemented for nearly 10 years) are no longer effective in managing the risk.		
BPI Assessment	There would appear to be a definite need to undertake the replacement of these cables from the information provided – we note the concerns about the partial discharge readings and oil leaks. However, the generators are planned for decommissioning in 2016. This project requires specialised HV cable and there is a lead time on ordering and manufacture. Consequently it is unlikely that the work would not now be completed until mid to late 2014 at the earliest. Consequently, the new cables would have less than two years in service. NIE has not presented a case to show that the exclusion zones and other measures, which have been implemented to manage the risk, are no longer adequate and cannot be extended until at least 2016. The apparent uncertainty about the closure of Ballylumford G5 and G6 should be addressed if possible. We believe it would be beneficial to consider cable replacement only if planned decommissioning of the generators is delayed beyond 2016/2017.		
BPI Recommendation	No allowance in RP5		

Source: NIE Strategy Paper A1

TRANSMISSION		Project No	T37
NIE Project Title	**Hannahstown-Lisburn 110kV OHL Upgrade**		
NIE Project Description	The project is to upgrade the conductor on the two 7km Hannahstown – Lisburn wood pole overhead lines. The new conductor should be rated at least 150MVA.		
NIE Project Justification	The proposed 400kV north-south interconnector is planned to be in service by 2016, will increase the network transfer capability to circa 1000MVA. The rating of the Hannahstown – Lisburn circuits would be overloaded under these conditions. For several credible 275kV fault scenarios, the Hannahstown – Lisburn circuits can be significantly overloaded. Under these conditions the main 275kV power flow route from north to south is not available and higher power flows are forced onto the 110kV circuits. The worst case however is for a specific single circuit 275kV outage followed by a forced outage of one of the Hannahstown – Lisburn 110kV circuits with the other potentially overloaded. With the higher transfers expected with the new north south interconnector this overload can be severe.		
NIE Request	£800,000		
UR Determination Findings	Project may be included with the North-South Connection activities and it not required before then. To be included in RP6.		
BPI Assessment	Agreement between NIE and UR to defer. No further assessment required.		
BPI Recommendation	No allowance in RP5		

Source:

NIE Strategy Paper A1

UR44 spreadsheet

TRANSMISSION		Project No	T40
NIE Project Title	**ESQCR Transmission**		
NIE Project Description	The Electricity, Safety, Quality and Continuity Regulations 2002 (ESQCR) came into force on 31st January 2003 in Great Britain and were further amended in 2006. They replaced the GB Electricity Supply Regulations. The regulations currently apply to public and private operators in England, Scotland and Wales and are about to be introduced in Northern Ireland. These regulations specify safety standards and are aimed at protecting the general public and consumers from danger. In addition, ESQCR specify power quality and supply continuity requirements to ensure an efficient and economic electricity supply to consumers. The paper describes the introduction of similar legislation in Northern Ireland and the financial implications.		
NIE Project Justification	On the introduction of ESQCR in GB, Network operators (NOs) were given a period of five years in which to carry out a formal risk assessment of their overhead line network and a period of up to ten years in which to carry out any remedial works although high risk sites are to be rectified as soon as is practicable. It is anticipated that similar regulations and timescales will apply in Northern Ireland. A new requirement is for network operators to establish a formal risk register of their assets. ESQCR also stipulates a range of specific requirements such as the position and insulation of lines and the provision of danger signs, anti-climbing devices and stay insulators. The primary drivers in this asset category are legislative changes. Key activities planned for are as follows:- • £0.75M Asset Register development cost • £3.5M for 10 patrollers to conduct asset surveys • £84,509,634 Remedial work fitting of safety signage & equipment • £4,860,200 Vegetation management • £1,766,400 Public awareness **Total ESQC Compliance Project Estimate:£95,206234** This project is phased based on a percentage of work prioritised and allocation of remedial works as follows:- **RP5 – £23,000,000 RP6 - Balance**		
NIE Request	£2,000,000		
UR Determination Findings	NIE requested a very substantial amount of funding, based on a high level estimate of the volume of work that might be required and the solutions that might be appropriate. We accept that some work will need to be undertaken, however NIE has assumed more costly solutions to some issues than were considered necessary in GB and work that has been undertaken to the same standards as GB (where this legislation already applies) has been ignored. NIE is already being funded for a full survey of all its assets under the rolling programmes of asset replacement, and we expect ESQCR data collection to be included within these surveys, as this would be considered efficient. The cost of surveys and tree cutting has been benchmarked against GB, where these costs are already incurred.		

	We have included £1million in the "input driven items" to cover the risk assessments and any specific surveys that cannot be undertaken by the staff conducting routine surveys. We expect all asset replacement work under Fund 1 to be undertaken to a standard that complies with this legislation
BPI Assessment	Refer to D43 for full assessment, BPI found insufficient justification. The Utility Regulator has allowed £250k for the data gathering activity but detail of how this arrived at is not evident. Therefore BPI has used the forecasted costs based on NIE's strategy paper F1. In conclusion, Based on the NIE paper F1, BPI consider the allowance for RP5 cost for:- • Development of Asset Register (Split 90% Distribution & 10% Transmission) (£750,000 (Ref 3.1 Paper F1)) (Split is calculated from number of structures Paper F1 Table 1 page2) • Additional patrolling costs are not required for Transmission. Note NIE's paper (page 2) notes no additional transmission patrollers will be needed due to current work content and phasing. BPI considers the bulk of any remedial ESQCR compliance should be determined based on actual data and records completed in PR5. The findings can then be presented in the next review period.
BPI Recommendation	BPI recommends development of transmission element of the asset management database records On a pro-rata basis the total cost of the asset register is estimated at £750,000. The contribution made by Transmission is £75,000. There are no other associated costs.

Item	No	Cost (£)	Total	Comments
Asset Register			75,000	
Pro-rata Technical Design and Project Management			0	
Adjustment for 10% efficiency on indirect costs			0	
Total			**75,000**	

Source:

NIE Strategy Paper F1

UR44 spreadsheet

TRANSMISSION		Project No	T41
NIE Project Title	**Transmission Capitalised Overheads**		
NIE Project Description	Allocation of overheads associated with cost areas and involved in the delivery of capital projects. The proportion of overheads capitalised is based on the activity levels within these areas between work which is capital in nature and that which is revenue in nature.		
NIE Project Justification	International Accounting Standard 16 'Property, Plant and Equipment' (ISA 16) states that the cost of an asset will include any costs directly attributable to bringing the asset to the location and condition management. The overheads identified directly related to capital projects and therefore it is appropriate that these costs are capitalised.		
NIE Request	£3,627,000		
UR Determination Findings	We accept that a certain amount of overhead is required to deliver an efficient capital programme. However, the magnitude of this overhead varies with the scale of that programme. We have reduced the amount in proportion with the total capex funding we have included in our final determination for distribution.		
BPI Assessment	The capital expenditure programme was subject to a benchmarking exercise undertaken by PB Power and Frontier Economics. These studies were commissioned by NIE and were reviewed by SKM and CEPA acting on behalf of UR. There remains a lack of clarity about the comparability of NIE's costs and benchmark data, particularly with the use of Powerteam rates and we understand that a further benchmarking exercise is being undertaken to consider the efficiency of NIE's indirect costs. Whilst we are not convinced of the need for a separate allowance for these costs in addition to the costs already allowed for in other projects, we recommend that a final decision on should be made after the conclusion of that work. To calculate this allowance BPI scaled the Final Determination allowance in direct proportion to the total amount of capital expenditure on the basis that whilst in the short term costs may be fixed in nature, over the longer term they are variable. Pending the outcome of the benchmarking exercise to consider indirect costs we have made an allowance for these overheads on the same basis as UR. We have adjusted the final Determination figures allowed by UR to reflect the changes in our assessment on a pro-rata basis.		
BPI Recommendation	Pending the outcome of the benchmarking of indirect costs we recommend an allowance of £2,245,092 in RP5		

NIE DISTRIBUTION PROJECTS DETAILED REVIEW

DISTRIBUTION		Project No	D6
NIE Project Title	**Distribution Tower Lines**		
NIE Project Description	This project covers the replacement of poor condition overhead line steel tower components. The majority of 33kV overhead circuits are wood pole line construction but some lines; approximately 70km were constructed with steel tower supporting structures which allow for longer span lengths and greater conductor heights. Over half of these assets were constructed in 1930 by the Antrim Light and Power Company.		
NIE Project Justification	Excluding those lines which have been recently refurbished, the distribution tower line network is generally in poor condition. There are a number of conductors and earth wires showing visible signs of corrosion. The insulator condition combined with the level of wear on shackles necessitates a replacement programme. Tower steelwork is of particular concern with heavy levels of surface corrosion identified on a significant number of the towers and with some towers now requiring complete replacement. The drivers for asset replacement on steel tower circuits therefore include network availability, reliability and public safety.		
NIE Request	£2.254m		
UR Determination Findings	We assessed the information provided by NIE, and despite significant follow up questioning, we could not clarify the link between the condition information and the volumes requested. We therefore applied Ofgem's DPCR5 top down asset replacement modelling approach. We applied a 10% adjustment to the indirect cost element of this work to account for NIE's inefficiency in this area. One particular concern we had with this project was NIE's intention to undertake like for like replacements, when these assets were not the type that would normally be installed for this situation. We believe that replacement based on current engineering norms should have been considered by NIE as these would have a lower overall cost. Tower lines have a greater visual impact than pole-lines. Our determination is based on current design standards.		
BPI Assessment	NIE clearly have concerns about the condition of some its distribution steel tower lines and have collated sufficient information on asset condition to put forward a strong case for this expenditure. However, the Regulator makes the point that 33kV and 11kV overhead lines to current standards would be installed using wood pole construction and therefore replacement of tower lines at this voltage, rather than refurbishment, should be considered. It also claims it is difficult to link the asset condition data with the asset outturn units (volume) and costs. Generally it can be difficult to replace steel tower lines with a wood pole equivalent because it would be necessary to effectively wayleave a complete new route. Spans will be shorter resulting in new support positions and in any case it is likely that any new build would have to be constructed off line so as to ensure the existing line can remain energised with only relatively short outages to connect the circuits for security of supply reasons. Replacement of tower lines is also compounded if they are double circuit, as many of those in the refurbishment programme are. Additionally, DNOs often prefer to maintain tower lines, particularly those constructed for higher voltages, to more easily allow for future uprating of the circuits.		

	We note that that the Regulator, in the absence of supporting information from NIE, has made a determination and applied Ofgem's DPCR5 top down asset replacement modelling approach with implied industry lives. BPI does, however, have some reservations about this as explained in the main body of the report and believes actual asset condition warrants a greater weighting. However, although we accept the level of expenditure to refurbish the existing tower lines, we have now reviewed the subsequent information received since the draft report was issued and in particular note the Regulator's view that use of the tower lines at EHV is unlikely in the future because of the existence of primary infrastructure. Albeit we accept that NIE may wish to retain these tower lines because of the problems in obtaining new permissions, nonetheless we are minded to reduce the expenditure for RP5 to that allowed by the Regulator. Should NIE be able to provide stronger evidence for the retention of these lines rather than new wood pole equivalents then additional expenditure can be allowed within RP6.
BPI Recommendation	

Cost Breakdown

Item	No	Cost (£)	Total (£)	Comments
Refurbishment			1,400,000	Detailed in NIE strategy paper D2, Table 1 (Page 3)
Condition Monitoring			13,500	Detailed in NIE strategy paper D2, Table 1 (Page 3) BPI highlight that this cost could be allocated to Opex
Vegetation Management			80,000	Detailed in NIE strategy paper D2, Table 1 (Page 3)
Total			**1,493,500**	

Source:

NIE Strategy Paper D2

UR44 spreadsheet

DISTRIBUTION		Project No	D7
NIE Project Title	**Refurbishment of 33kV overhead lines.**		
NIE Project Description	The 33kV overhead network is comprised of approximately 3110 km of wood pole overhead line construction. The 33kV network is less reticulated than the 11kV network in that it is generally configured as radial or ring circuits with very few spur lines. The circuits supply relatively large 33/11kV substations but there are significant sections that continue to supply both small villages and individual customers via smaller 33kV/LV pole mounted transformers.		
NIE Project Justification	In general, overhead lines should not be subject to wholesale like-for-like replacement at a point in time but should instead undergo cyclic refurbishment driven by condition monitoring of the individual line components. This is best practice adopted by the industry in general in the UK. Refurbishment and targeted asset replacement (TAR) programmes of work, allied with a programme of re-engineering will, over time, prevent deterioration in overall network performance and ensure there are no safety issues. This strategy will also address in a timely and cost effective manner those circuits which exhibit performance that is well below an acceptable level. TAR is aimed at improving storm resilience and is based on a 5 year cycle. The objective of the refurbishment programme is that each overhead line circuit would be refurbished every 15 years, with the replacement of those major components identified as being defective. Re-engineering is required when it is assessed that refurbishment would not deliver either a practical or a cost-effective solution. This will be the case for a small number of circuits in the refurbishment programme. The primary drivers for investment in the distribution overhead line are therefore maintenance of network performance, public safety and resilience to storms. (BPI Note: we understand that currently NIE are conducting TAR on a three year cycle for 33kV OHL only to assess its efficiency and benefits.)		
NIE Request	£11.552m		
UR Determination Findings	NIE was not able to demonstrate that its proposed cycles are more efficient than those adopted elsewhere (Three years vs. five years common practice). We therefore used Ofgem's DPCR5 asset replacement modelling approach to ensure that an equivalent volume of work is funded. We reviewed NIE's tree cutting costs and compared these with data they have for GB and RoI. The costs incurred by NIE's sister company in RoI were significantly lower than in GB due to the lower density of tree cover. The benchmarking showed (that when adjusted for the density of tree cover in Northern Ireland), NIE's costs were disproportionately high and we made an adjustment to the amounts included in our final determination to reflect this.		

NIE Case to CC

NIE Statement of Case - Annex 7A Extract:-

Table 4 – Summary of Tree Cutting costs benchmarking

Company	Direct Costs (£k/km)	Direct plus Indirect Costs (£k/km)
DNO Average	1.79	2.22
Upper Quartile (Exc. NIE)	1.38	1.73
SSE Hydro	0.87	1.17
NIE submitted costs	0.84	1.36
Utility Regulator FD Allowance		0.54

Based on this analysis, NIE's Consultant Parsons Brinkerhoff (PB) believes that the benchmarking shows clearly that the amount allowed by the Utility Regulator to NIE for tree cutting is grossly inadequate. The Utility Regulator has proposed an allowance of £0.54k/km on a direct plus indirect cost basis. This is (a) less than one third of the DNO best performers; and (b) less than half of that allowed to SSE Hydro (and only 62% of SSE Hydro's direct costs allowance).

A summary of NIE's benchmarking is presented in Table 9 below.

Table 9: Benchmarked Overhead Line Refurbishment Costs

Company	Direct Costs (£k/km)	Direct plus Indirect Costs (£k/km)
DNO Average	2.74	3.42
Upper Quartile (Exc. NIE)	2.54	3.17
SSEH	2.61	3.55
NIE	1.84	3.0
Utility Regulator Allowance	-	2.35

Analysis of this table shows that NIE's refurbishment expenditure is low by comparison with the DNO best performers.

The benchmarking shows that NIE's direct costs per unit of work are 66% of the GB DNO average (88% on a direct plus indirect basis). Relative to the GB DNO peer group, PB considers this evidence to show that NIE's proposed costs in this respect are reasonable and that the Utility Regulator's allowance is inadequate.

Critique of UR benchmarking against ESB and DNOs

The Utility Regulator reduced the tree cutting allowance for NIE on the basis of benchmarking carried out by SKM for CER in 2010.

PB believes that the Utility Regulator's analysis is unreliable as a consequence of errors in the analysis carried out for CER. Specifically; SKM divided tree cutting costs by the total length of circuit, i.e. overhead line and underground cable, rather than by overhead line length alone. The SKM report 'CER Transmission & Distribution Price Control – Review of Distribution Operating Costs 2006 – 2015' comments on page 70;

GB tree cutting costs are €196m for 780,482 km of overhead line or

€251 per km of overhead line 2.14 SKM's error is apparent from the following table which shows the breakdown of the GB DNO circuit lengths extracted from the Ofgem 2007/08 Quality of Supply Report.

BPI Assessment	In the review of this project BPI have found two key areas of significance:- 3. Differing approach to asset replacement assessment NIE's 'bottom up' condition based approach compared with the Utility Regulators' 'top down view' comparing NIE against other distribution businesses. 4. Differences in tree cutting allowances based on benchmarking studies. Asset Replacement (Perpetual Asset Strategy): In summary NIE use a three separate but coordinated programmes of • Targeted Asset Replacement (TAR) –At individual pole level (3 year cycle) proactively targeting defects not prioritised for Refurbishment. • Refurbishment – At each line level replacing major defective components (but not conductors) – (15 year cycle) • Reengineering – When a small number of circuits from the refurbishment programme assess reconductoring is essential due to extremely poor condition. Reengineering will look to use the opportunity to improve circuit design also. NIE have set out an asset replacement strategy for 33kV OHL maintenance based on 3-year cycle of Target Asset replacement (TAR) which included tree-cutting and minor repairs in parallel with a 15 year condition based refurbishment programme. In addition where the extent of refurbishment requires lengths of line to be re-engineered this is also carried out on a condition assessment basis. We consider approach as being good practice. BPI note UR considers the rate of re-conductoring to be excessive with an equivalent life of circa 56 years compared with DPCR5/6 lives of 66 years. Hence have considered lines subject to re-engineering to be amended in the final determination. Since BPI's conference call on 3rd July 2013, further correspondence from both NIE and the Utility Regulator has been issued concerning this area. In summary, further clarifications have been issued and the Utility Regulator's consultant (SKM) has calculated implicit lives of 65 and 60 years for 33kV and 11kV lines respectively and reached agreement that this is in line with industry expectations. (Reference: Issues arising from conference call between BPI & UR on Wednesday 3 July 2013, UR-72) BPI's view is that the 'Perpetual Asset Strategy' of cyclic refurbishment driven by condition monitoring of line components is reasonable industry practice. It is worth noting that Northern Ireland has more rural network than GB, which in coastal areas do become prone to saline corrosion and hence may be likely to require some replacement prior to the nominal asset life. Because of this BPI believe that the initial DPCR 5 modelling may not reflect actual conductor condition. We have recommended that the NIE proposed volumes, which reflect a significant increase on RP4 volumes are allowed. Recommended volumes are: Re-engineering - 297 km Refurbishment – 738km TAR – 4,145km Tree Cutting: From the information provided on tree cutting (specifically the PB benchmarking report), NIE raise some significant concerns over the UR modelling conducted by SKM and point to issues that don't initially appear to have been sufficiently addressed.

	Based on the initial information provided the regulators tree cutting allocation is claimed to be insufficient. Since BPI's conference call on 3rd July 2013, further correspondence from both NIE and the Utility Regulator has been issued concerning this area. The Utility Regulator has instructed their consultant SKM to produce a tree cutting paper in order to address NIE's statement of case issues (Reference, Annex 7 A.2 (Tree Cutting Operations) dated 17th July 2013). Key points to note are as follows:- 5. The reference to total circuit length (overhead & underground cable) is a late amendment error and has been corrected having no effect on the underlying conclusion of GB not being comparable with DSO. 6. The GB DNO comparison is favourable to show relative efficiency of NIE, but a better comparison is ESB DSO (Republic of Ireland, RoI) due to its closer match to NIE. 7. The subsequent SKM analysis shows costs of €251/km (GB DNO) and €119/km (RoI DSO) less than half. 8. SKM point out a key difference of NIE using a largely in house tree cutting team (30 patrollers and 50 tree cutters and specialist contractors) where RoI DSO uses competitive tendered work to contractors. The UR concludes that the key difference in costs (bullet 3 above) are largely explained by more efficient working practices of using competitive local contractors on an on-going basis. On this basis a near 1/3rd saving has been factored in the RP5 tree cutting allowances by the Utility Regulator. BPI agree with the analysis indicating GB DNO is not a well matched comparator with NIE and the information showing RoI DSO to be a closer match. The RoI DSO comparison would remove the GB ESQCR and largely the GB the tree cover differences and narrow down the difference closer to varying efficiencies in tree cutting practices of RoI DSO and NIE. BPI considers it reasonable for the Utility Regulator to drive efficiency toward a peer Network Operator similar to RoI DSO and hence don't consider an efficiency reduction unreasonable. BPI has not been provided with the full workings from UR for the 1/3rd saving expected. However BPI have made a calculation (more detail is provided in the body of the BPI report) • The Ratio of RoI to GB costs (€) = 119/251=0.4741 is used • Applied to Average DNO comparison (on a direct plus indirect cost basis) (Ref NIE PB Benchmarking report (Annex 7 A NIE Statement of Case) = 2.22x0.4741=1.0525 k£/km • 1.0525/NIE Request 1.36 = 0.7739 or 0.2261 (22.61%) reduction factor determined to bring the NIE Request to closer alignment with RoI DSO. NIE has provided the following forecast on tree cutting costs in response to the Utility Regulators questions (Ref Spread Sheet UR67, Cell G/64), which BPI have determined the reductions from as follows:- 11kV – 20800km @ £1k = £20.8m x 0.2261 =£4.7021m reduction to apply 33kV – 5180km @ £600 = £3.1m x 0.2261 = £0.7009m reduction to apply LV – 3800km @ £1500 = £5.7m x 0.2261 = £1.2888m reduction to apply

	Conclusion BPI's view is to support NIE's 'Perpetual Asset Strategy' and allow the original NIE Request but with an appropriate reduction for conductor replacement ahead of need. . BPI view that scope exists for tree cutting economies to be achieved and a reduction has been applied for this. Since the final report was published for review, NIE have proposed an alternative adjustment because the benchmark costs used in the above calculation included overhead costs as well. As the fixed Overhead Line overhead costs have not been allowed adjustment proposed by BPI is in effect double counting. Hence the reduction in OHL has been reduced to 10.81% as proposed by NIE. The resultant unit costs for all three types of work are shown below.
BPI Recommendation	Volumes as per NIE's Request volumes and apply the reduction factor for more efficient tree cutting practices

Cost Breakdown – 33kV

33 kV (Voltage) Item	RP5 Volume (km)	Assumed Unit Rate £k/km	Total Cost £	Comments
Re-engineer	297	18,829	5,592,310	
Refurbish	738	4,649	3,431,133	
TAR	4,145	530	2,195974	
Total			**11,219,417**	

<table>
<tr><td>DISTRIBUTION</td><td></td><td>Project No</td><td>D8</td></tr>
<tr><td>NIE Project Title</td><td colspan="3">Refurbishment of 11kV overhead lines.</td></tr>
<tr><td>NIE Project Description</td><td colspan="3">The 11kV and 6.6kV overhead networks are comprised of approximately 20,800 km of wood pole overhead line construction. This project covers the refurbishment of the 11kV overhead line network on a cyclic basis in order to maintain an acceptable level of network performance and to prevent network deterioration.</td></tr>
<tr><td>NIE Project Justification</td><td colspan="3">In general, overhead lines should not be subject to wholesale like-for-like replacement at a point in time but should instead undergo cyclic refurbishment driven by condition monitoring of the individual line components. This is best practice adopted by the industry in general in the UK.

Refurbishment and targeted asset replacement (TAR) programmes of work, allied with a programme of re-engineering will, over time, prevent deterioration in overall network performance and ensure there are no safety issues. This strategy will also address in a timely and cost effective manner those circuits which exhibit performance that is well below an acceptable level.

TAR is aimed at improving storm resilience and is based on a 5 year cycle. The objective of the refurbishment programme is that each overhead line circuit would be refurbished every 15 years, with the replacement of those major components identified as being defective. Re-engineering is required when it is assessed that refurbishment would not deliver either a practical or a cost-effective solution. This will be the case for a small number of circuits in the refurbishment programme.

The primary drivers for investment in the distribution overhead line are therefore maintenance of network performance, public safety and resilience to storms.</td></tr>
<tr><td>NIE Request</td><td colspan="3">£68.261m</td></tr>
<tr><td>UR Determination Findings</td><td colspan="3">NIE was not able to demonstrate that its proposed cycles are more efficient than those adopted elsewhere. We therefore used Ofgem's DPCR5 asset replacement modelling approach to ensure that an equivalent volume of work is funded.

We reviewed NIE's tree cutting costs and compared these with data they have for GB and RoI. The costs incurred by NIE's sister company in RoI were significantly lower than in GB due to the lower density of tree cover. The benchmarking showed (that when adjusted for the density of tree cover in Northern Ireland), NIE's costs were disproportionately high and we made an adjustment to the amounts included in our final determination to reflect this.</td></tr>
<tr><td>NIE Case to CC</td><td colspan="3"><u>NIE Statement of Case - Annex 7A Extract:-</u>

Table 4 – Summary of Tree Cutting costs benchmarking

<table>
<tr><th>£k/km</th><th>Direct Costs</th><th>Direct plus Indirect Costs</th></tr>
<tr><td>DNO Average</td><td>1.79</td><td>2.22</td></tr>
<tr><td>Upper Quartile(Exc. NIE)</td><td>1.38</td><td>1.73</td></tr>
<tr><td>SSE Hydro</td><td>0.87</td><td>1.17</td></tr>
<tr><td>NIE submitted costs</td><td>0.84</td><td>1.36</td></tr>
<tr><td>Utility Regulator FD Allowance</td><td></td><td>0.54</td></tr>
</table>
Based on this analysis, PB believes that the benchmarking shows clearly that the amount allowed by the Utility Regulator to NIE for tree cutting is grossly inadequate.</td></tr>
</table>

The Utility Regulator has proposed an allowance of £0.54k/km on a direct plus indirect cost basis. This is (a) less than one third of the DNO best performers; and (b) less than half of that allowed to SSE Hydro (and only 62% of SSE Hydro's direct costs allowance).

A summary of NIE's benchmarking is presented in Table 9 below.

Table 9: Benchmarked Overhead Line Refurbishment Costs

£k/km - based on Ofgem IPs	Direct Costs	Direct plus Indirect Costs
DNO Average	2.74	3.42
Upper Quartile (Exc. NIE)	2.54	3.17
SSEH	2.61	3.55
NIE	1.84	3.0
Utility Regulator Allowance	-	2.35

Analysis of this table shows that NIE's refurbishment expenditure is low by comparison with the DNO best performers.

The benchmarking shows that NIE's direct costs per unit of work are 66% of the GB DNO average (88% on a direct plus indirect basis). Relative to the GB DNO peer group, PB considers this evidence to show that NIE's proposed costs in this respect are reasonable and that the Utility Regulator's allowance is inadequate.

Critique of UR benchmarking against ESB and DNOs

The Utility Regulator reduced the tree cutting allowance for NIE on the basis of benchmarking carried out by SKM for CER in 2010.

PB believes that the Utility Regulator's analysis is unreliable as a consequence of errors in the analysis carried out for CER. Specifically; SKM divided tree cutting costs by the total length of circuit, i.e. overhead line and underground cable, rather than by overhead line length alone. The SKM report 'CER Transmission & Distribution Price Control – Review of Distribution Operating Costs 2006 – 2015' comments on page 70;

GB tree cutting costs are €196m for 780,482 km of overhead line or

€251 per km of overhead line 2.14 SKM's error is apparent from the following table which shows the breakdown of the GB DNO circuit lengths extracted from the Ofgem 2007/08 Quality of Supply Report.

BPI Assessment

In the review of this project BPI have found two key areas of significance:-

5. Differing approach to asset replacement assessment NIE's 'bottom up' condition based approach compared with the Utility Regulators' 'top down view' comparing NIE against other distribution businesses.
6. Differences in tree cutting allowances based on benchmarking studies.

Asset Replacement (Perpetual Asset Strategy):

In summary NIE use a three separate but coordinated programmes of

- Targeted Asset Replacement (TAR) –At individual pole level (5 year cycle) proactively targeting defects not prioritised for Refurbishment.
- Refurbishment – At each line level replacing major defective components (but not conductors) – (15 year cycle)
- Reengineering – When a small number of circuits from the refurbishment programme assess reconductoring is essential due to extremely poor condition. Reengineering will look to use the opportunity to improve circuit design also.

	NIE have set out an asset replacement strategy for 11kV OHL maintenance based on 5-year cycle of Target Asset replacement (TAR) which included tree-cutting and minor repairs in parallel with a 15 year condition based refurbishment programme. In addition where the extent of refurbishment requires lengths of line to be re-engineered this is also carried out on a condition assessment basis. We consider approach as being good practice. BPI note UR considers the rate of re-conductoring to be excessive with an equivalent life of circa 56 years compared with DPCR5/6 lives of 66 years. Hence have considered lines subject to re-engineering to be amended in the final determination. Since BPI's conference call on 3rd July 2013, further correspondence from both NIE and the Utility Regulator has been issued concerning this area. In summary, further clarifications have been issued and the Utility Regulator's consultant (SKM) has calculated implicit lives of 65 and 60 years for 33kV and 11kV lines respectively and reached agreement that this is in line with industry expectations. (Reference: Issues arising from conference call between BPI & UR on Wednesday 3 July 2013, UR-72) BPI's view is that the 'Perpetual Asset Strategy' of cyclic refurbishment driven by condition monitoring of line components is reasonable industry practice. It is worth noting that Northern Ireland has more rural network than GB, which in coastal areas do become prone to saline corrosion and hence may be likely to require some replacement prior to the nominal asset life. Because of this BPI believe that the initial DPCR 5 modelling may not reflect actual conductor condition. We have recommended that the NIE proposed volumes, which reflect a significant increase on RP4 volumes are allowed. Re-engineering - 1,926 km Refurbishment – 4,949km TAR – 13,865km **Tree Cutting:** From the information provided on tree cutting (specifically the PB benchmarking report), NIE raise some significant concerns over the UR modelling conducted by SKM and point to issues that don't initially appear to have been sufficiently addressed. Based on the initial information provided the regulators tree cutting allocation is claimed to be insufficient. Since BPI's conference call on 3rd July 2013, further correspondence from both NIE and the Utility Regulator has been issued concerning this area. The Utility Regulator has instructed their consultant SKM to produce a tree cutting paper in order to address NIE's statement of case issues (Reference, Annex 7 A.2 (Tree Cutting Operations) dated 17th July 2013). Key points to note are as follows:- • The reference to total circuit length (overhead & underground cable) is a late amendment error and has been corrected having no effect on the underlying conclusion of GB not being comparable with DSO. • The GB DNO comparison is favourable to show relative efficiency of NIE, but a better comparison is ESB DSO (Republic of Ireland RoI) due to its closer match to NIE. • The subsequent SKM analysis shows costs of €251/km (GB DNO) and €119/km (RoI DSO) **less than half**.

	• SKM point out a key difference of NIE using a largely in house tree cutting team (30 patrollers and 50 tree cutters and specialist contractors) where RoI use competitive tendered work to contractors. The UR concludes that the key difference in costs (bullet 3 above) are largely explained by more efficient working practices of using competitive local contractors on an on-going basis. On this basis a near 1/3rd saving has been factored in the RP5 tree cutting allowances by the Utility Regulator. BPI agree with the analysis indicating GB DNO not to be a well matched comparator with NIE and the information showing RoI to be a closer match. The RoI comparison would remove the GB ESQCR and largely the GB the tree cover differences and narrow down the difference closer to varying efficiencies in tree cutting practices of RoI and NIE. BPI considers it reasonable for the Utility Regulator to drive efficiency toward a pier Network Operator similar to RoI and hence don't consider an efficiency reduction unreasonable. BPI has not been provided the full regulators workings for the 1/3rd saving expected. However BPI have made a calculation (more detail is provided in the body of the BPI report) • The Ratio of RoI to GB costs (€) = 119/251=0.4741 is used • Applied to Average DNO comparison (on a direct plus indirect cost basis) (Ref NIE PB Benchmarking report (Annex 7 A NIE Statement of Case) = 2.22x0.4741=1.0525 k£/km • 1.0525/NIE Request 1.36 = 0.7739 or 0.2261 (22.61%) reduction factor determined to being the NIE Request to closer alignment with RoI NIE has provided the following Request on tree cutting costs in response to the Utility Regulators questions (Ref Spread Sheet UR67, Cell G/64), which BPI have determined the reductions from as follows:- 11kV – 20800km @ £1k = £20.8m x 0.2261 =£4.7021m reduction to apply 33kV – 5180km @ £600 = £3.1m x 0.2261 = £0.7009m reduction to apply LV – 3800km @ £1500 = £5.7m x 0.2261 = £1.2888m reduction to apply Transmission - £1.49m x 0.2261 = £0.3390m reduction to apply **Conclusion** BPI's view is to support NIE's 'Perpetual Asset Strategy' and allow the original NIE Request. BPI's view is that scope exists for tree cutting economies to be achieved and a reduction has been applied for this. Since the final report was published for review, NIE have proposed an alternative adjustment because the benchmark costs used in the above calculation included overhead costs as well. As the fixed Overhead Line overhead costs have not been allowed adjustment proposed by BPI is in effect double counting. Hence the reduction in OHL has been reduced to 10.81% as proposed by NIE. The resultant unit costs for all three types of work are shown below.
BPI Recommendation	Volumes as per NIE Request and reduction for more efficient tree cutting practices.

Cost Breakdown – 11kV

11 kV (Voltage) Item	RP5 Volume (km)	Unit Rate £k/km	total Cost (£)	Comments
Re-engineer	1,986	16,820	33,404,719	
Refurbish	4,949	4,128	20,430,846	
TAR	13,865	880	12,205,433	
Total			**66,040,998**	

DISTRIBUTION		Project No	D9
NIE Project Title	**Refurbishment of LV overhead lines.**		
NIE Project Description	This project covers the cyclic refurbishment of LV overhead lines. This will entail a range of activities including replacement of decayed poles, replacement of fittings and cutting of trees and other vegetation. Refurbishment of 1,600km of line will be carried out to a specification that will seek to allow for no further significant intervention for a further fifteen years. Targeted asset replacement (TAR), applied to the remainder of the network, will seek to address individual defects that cannot be deferred until the next refurbishment cycle. The modest programme (15km) of selective undergrounding will be targeted at sections of network where either access to carry out refurbishment is not achievable or where for example, the degree of pole decay is very significant, and undergrounding is the optimal solution.		
NIE Project Justification	Approximately 5,400km of NIE‟s low voltage (LV) mains network is overhead line construction largely using wood poles. Generally the construction is un-insulated conductors strung between insulators attached to the poles. A substantial proportion of this network was constructed between the late 1950s and the mid-1970s to facilitate rural electrification. Due to the age of this network, its exposure to the weather, encroachment from trees and vegetation etc. there is a requirement to invest in a programme of asset replacement and vegetation management to ensure that, in particular, the risks to performance, safety and storm resilience are adequately managed.		
NIE Request	£21.411m		
UR Determination Findings	NIE was not able to demonstrate that its proposed cycles are more efficient than those adopted elsewhere. We therefore used Ofgem's DPCR5 asset replacement modelling approach to ensure that an equivalent volume of work is funded. We reviewed NIE's tree cutting costs and compared these with data they have for GB and RoI. The costs incurred by NIE's sister company in RoI were significantly lower than in GB due to the lower density of tree cover. The benchmarking showed (that when adjusted for the density of tree cover in Northern Ireland), NIE's costs were disproportionately high and we made an adjustment to the amounts included in our final determination to reflect this.		

NIE Case to CC

A summary of NIE's benchmarking is presented in Table 9 below.

Table 9: Benchmarked Overhead Line Refurbishment Costs

£k/km - based on Ofgem IPs	Direct Costs	Direct plus Indirect Costs
DNO Average	2.74	3.42
Upper Quartile (Excl. NIE)	2.54	3.17
SSEH	2.61	3.55
NIE	1.84	3.0
Utility Regulator Allowance	-	2.35

Analysis of this table reveals that NIE's refurbishment expenditure is below the GB DNOs best performers.

The benchmarking shows that NIE's direct costs per unit of work are 66% of the GB DNO average (88% on a direct plus indirect basis). Relative to the GB DNO peer group, PB considers this evidence to show that NIE's proposed costs in this respect are reasonable and that the Utility Regulator's allowance is inadequate.

Deliverables

Planned by NIE

Refurbish 1600km

TAR 3800km

This project covers the cyclic refurbishment of 1,600km LV overhead lines including replacement of decayed poles, replacement of fittings and cutting of trees and other vegetation. Refurbishment of line will be carried out to a specification that will seek to allow for no further significant intervention for a further fifteen years. Targeted asset replacement (TAR), applied to the remainder of the network, will seek to address individual defects that cannot be deferred until the next refurbishment cycle. The project also includes a programme of circa 15km of selective undergrounding will be targeted at sections of network where either access to carry out refurbishment is not achievable or where for example, the degree of pole decay is very significant, and undergrounding is the optimal solution

BPI Assessment

In the review of this project BPI have found two key areas of significance:-

7. Case for asset replacement using NIE's partial LV asset data compared with the Utility Regulators modelling comparing against other distribution businesses.
8. Differences in tree cutting allowances based on benchmarking studies.

<u>On item 1 BPI have the following Observations:-</u>

Condition of the LV Overhead Network

BPI notes that NIE consider that the significant majority of LV overhead conductor remains serviceable.

Extent & nature of faults

NIE's conclusion in strategy paper D4 appendix 2 is that the majority of LV overhead faults during the five years (2004/05 to 2008/9) were caused by trees or wind borne material and clashing conductors, and proportionately faults due to pole failure is low. BPI does however appreciate the serious consequence of the less likely case of fault due to pole failure.

BPI has found that the engineering arguments in NIE's strategy paper on conductors and wood pole decay on the whole to be balanced and logical.

BPI note from the information reviewed that there is an evident lack of asset data on the LV network due to:-

1- The precise ages of any individual LV overhead asset not being classified in any asset database
2- The LV overhead asset data not being collected and collated
3- At the time of the submission approximately 25% of the asset base had been assessed.

BPI Conclusion on asset replacement:

Prior to NIE having concluded its actual condition based evaluation against ESQCR during RP5, BPI consider the Utility Regulator's modelling to be an appropriate alternative approach to reach the RP5 volumes for this project.

With respect to Land Locked Poles; BPI's view is that a like for like replacement would result in a short term economy and is not optimal as it would simply defer the same problem. BPI therefore agrees that undergrounding may be the viable alternative and hence support this aspect of the investment request.

BPI have established as a result of meetings held by the Competition Commission between NIE and the Utility Regulator, that the final determination excludes £2.3m allocated for land locked poles which we have adjusted back into our cost breakdown. (Ref: UR119, paragraph 9).

We note that while NIE considers that pole-top equipment and conductors are generally in a serviceable condition, In absence of ESQCR investment NIE anticipate the need for some level of investment.

On item 2 - Tree Cutting; BPI have the following Observations:-

From the information provided on tree cutting (specifically the PB benchmarking report), NIE raise some significant concerns over the UR modelling conducted by SKM and point to issues that don't initially appear to have been sufficiently addressed.

Based on the initial information provided the regulators tree cutting allocation is claimed to be insufficient.

Since BPI's conference call on 3rd July 2013, further correspondence from both NIE and the Utility Regulator has been issued concerning this area.

The Utility Regulator has instructed their consultant SKM to produce a tree cutting paper in order to address NIE's statement of case issues (Reference, Annex 7 A.2 (Tree Cutting Operations) dated 17th July 2013).

Key points to note are as follows:-

9. The reference to total circuit length (overhead & underground cable) is a late amendment error and has been corrected having no effect on the underlying conclusion of GB not being comparable with DSO.
10. The GB DNO comparison is favourable to show relative efficiency of NIE, but a better comparison is ESB DSO (Republic of Ireland RoI) due to its closer match to NIE.
11. The subsequent SKM analysis shows costs of €251/km (GB DNO) and €119/km (RoI DSO) **less than half**.
12. SKM point out a key difference of NIE using a largely in house tree cutting team (30 patrollers and 50 tree cutters and specialist contractors) where RoI use competitive tendered work to contractors.

The UR concludes that the key difference in costs (bullet 3 above) are largely explained by more efficient working practices of using competitive local contractors on an on-going basis.

On this basis a near 1/3rd saving has been factored in the RP5 tree cutting allowances by the Utility Regulator.

BPI agree with the analysis indicating GB DNO not to be a well matched comparator with NIE and the information showing RoI to be a closer match. The RoI comparison would remove the GB ESQCR and largely the GB the tree cover differences and narrow down the difference closer to varying efficiencies in tree cutting practices of RoI and NIE.

BPI considers it reasonable for the Utility Regulator to drive efficiency toward a pier Network Operator similar to RoI and hence don't consider an efficiency reduction unreasonable.

BPI has not been provided the full regulators workings for the 1/3rd saving expected.

However BPI have made a calculation (more detail is provided in the body of the BPI report)

- The Ratio of RoI to GB costs (€) = 119/251=0.4741 is used
- Applied to Average DNO comparison (on a direct plus indirect cost basis) (Ref NIE PB Benchmarking report (Annex 7 A NIE Statement of Case) = 2.22x0.4741=1.0525 k£/km
- 1.0525/NIE forecast 1.36 = 0.7739 or 0.2261 (22.61%) reduction factor determined to being the NIE forecast to closer alignment with RoI

NIE has provided the following forecast on tree cutting costs in response to the Utility Regulators questions (Ref Spread Sheet UR67, Cell G/64), which BPI have determined the reductions from as follows:-

LV – 3800km @ £1500 = £5.7m x 0.2261 = £1.2888m reduction to apply

Hence revised tree cutting costs are £5.7m-1.2888m = **£4.41m**

UR FD figure is broken down as follows:-

UR Revised calculated unit costs of £13.3m + tree cutting at £3.85m = £17.15m (Source Utility Regulator Distribution Data Base (SKM Final Recommendations)

Using BPI tree reduction the following has been calculated:-

Revised BPI tree cutting cost of £4.41m + £13.3m unit cost **= £17.71m Total**

BPI Final Conclusion:

In summary BPI's view is that the final determination is appropriate in this case to achieve the asset replacement strategy outlined by NIE, providing the tree cutting element is adjusted to BPI's reduced levels.

BPI's view is to support NIE's 'Perpetual Asset Strategy' and allow the original NIE Request. BPI's view is that scope exists for tree cutting economies to be achieved and a reduction has been applied for this.

Since the final report was published for review, NIE have proposed an alternative adjustment because the benchmark costs used in the above calculation included overhead costs as well. As the fixed Overhead Line overhead costs have not been allowed adjustment proposed by BPI is in effect double counting. Hence the reduction in OHL has been reduced to 10.81% as proposed by NIE.

The resultant unit costs for all three types of work are shown below.

BPI Recommendation	Maintain proposed LV volumes and apply reduced unit costs.

Cost Breakdown

LV (Low Voltage) Item	**RP5 Volume (km)**	**Unit cost (£k/km)**	**Total cost**
TAR	3,800	1,338	5,083,830
Refurbishment – Urban +Rural	1,600	6,902	11,043,200
Tree Cutting associated with Refurbishment	1,600	1,338	2,140,560
Replacement of OH with UG – Direct Access	5	114,193	570,965
Replacement of OH with UG – Land Locked	10	169,753	1,697,530
Total			**20,536,085**

DISTRIBUTION		Project No	D12
NIE Project Title	**Distribution Overhead Lines Fixed Costs**		
NIE Project Description	This investment provision covers for the costs directly associated with the programming and management of the overhead line refurbishment programme.		
NIE Project Justification	The overhead line refurbishment and tree cutting programmes for 33kV, 11kV and LV are planned, programmed and managed by a dedicated team of staff. Their costs are directly attributed to this work stream. These programme costs include for: • Collection of asset condition information which prioritises and drives the investment programme • Pre-construction survey and wayleaving to provide detailed work plans for each circuit • Vegetation management – quantification and work plan development on a per circuit basis • Helicopter patrolling to identify defects, hazards and supplement the work plan • Provision of mobile generator on overhead line outages to mitigate customer outages.		
NIE Request	£18,063,754		
UR Determination Findings	We benchmarked the unit costs of NIE's overhead line work with those of the GB DNOs. The GB costs that were used in the benchmarking included all of the indirect costs associated with the overhead line programmes. These fixed costs are therefore already included in the amounts that have been identified for the individual programmes of work, to also include them here would be double counting. By including them in the specific programmes, NIE is therefore encouraged to minimise these costs and to deliver the programmes in an efficient manner.		
BPI Assessment	The capital expenditure programme was subject to benchmarking exercise undertaken by PB Power and Frontier Economics. These studies were commissioned by NIE and were reviewed by SKM and CEPA acting on behalf of UR. We have carefully reviewed the information provided and agree with both parties that the GB DNOs represent a suitable source of comparative information to use in benchmarking. In undertaking the benchmarking assessment it was important to ensure that unit costs were compared on a like for like basis. As part of the distribution price review process (DPCR5), Ofgem reviewed costs on a total cost basis, i.e. did not distinguish between direct and indirect costs. Unit costs used included indirect costs closely aligned with work programmes and included : • Network design and engineering; • Project management; • Engineering management and clerical support; and • Vehicles and transport In undertaking the benchmarking exercise the GB DNO information was separated into direct and indirect costs to allow comparison with NIE's unit costs. However, there has been significant disagreement between NIE and its advisers and UR and its advisers on whether overhead line fixed costs were included in the cost allowed for the overhead line programme. Our initial view was that these costs would fall within the definition of closely associated indirect costs and that there was sufficient allowance in the benchmark data to cover these costs and to provide a separate fund for these costs would be double counting. In addition, UR's analysis of costs compared with costs from RP4 suggests that that the overhead line programme already has sufficient allowance to cover these costs and we generally concur with that view.		

	However, there remains a lack of clarity about the comparability of NIE's costs and benchmark data, particularly with the use of Power team rates and we understand that a benchmarking exercise is being undertaken to consider the efficiency of NIE's indirect costs. Whilst we are not convinced of the need for a separate allowance for these costs in addition to the costs for the overhead line programme, we recommend that a final decision on should be made after the conclusion of that work.
BPI Recommendation	Pending the conclusion of the benchmarking of indirect costs, BPI recommends no separate allowance should be made in RP5

DISTRIBUTION		Project No	D14
NIE Project Title	**Primary Transformers**		
NIE Project Description	Replacement of thirty-two age expired poor condition 33/11kV and 33/6.6kV distribution transformers.		
NIE Project Justification	There are three hundred and ninety-six 33/11kV and 33/6.6kV distribution transformers located at 215 distribution substations. These assets are connected to the 33kV network and provide supply to the wider 11kV and 6.6kV secondary distribution network. On-going condition assessment of these assets has highlighted forty units and their associated auxiliary equipment that are in need of replacement. This programme of replacement will minimise the risk of in-service failure of these assets, which would have serious implications for supply availability across the wider network.		
NIE Request	£10.072m		
UR Determination Findings	We have concerns about the methodology and criteria that NIE uses to prioritise investment in this area. We believe that these have the potential to prioritise the replacement of perfectly serviceable assets in more densely populated areas ahead of higher risk assets in more sparsely populated (rural) areas. We have therefore based our final determination on Ofgem's DPCR5 asset replacement modelling. We have included a 10% efficiency adjustment to the indirect element of the costs.		
BPI Assessment	BPI note the following significant points in its assessment of this project:- There are two banks of 33/11 & 33.6.6kV Transformer age profiles. One bank of assets installed in the early 50's to late 70's and some newer installed assets between 1993 and 20010.On these assets some 396 fall into the earlier age profile. There are a number of tap changer induced failures evident in the NIE failure history (Appendix 2). Two such failures were noted as recent as 2010, with year of manufacture of 1970 but also in equipment installed in 1992. NIE replacement requirements are considered over a 10 year period to smooth access to the network and expenditure. NIE uses a model based on risk of failure and consequence as explained in the main body of the report. This is then applied to a risk-ranking table and individually scored. This is a generally accepted as good industry practice for managing assets and for determining an asset replacement programme. Additionally, as explained in the main body of the report, it is problematical to apply asset lifetime modelling techniques to such a small sample of strategically important assets – age and condition of individual items must be considered. There is evidence that the Utility Regulator did entertain NIE's risk assessed approach based on asset condition data, in the draft determination when an arbitrary probability threshold of 20 was accepted. In conclusion, based on the information provided, BPI recommends that the programme of prioritised 32 Primary Transformers should be funded and delivered in RP5		
BPI Recommendation	Allow expenditure for replacement of 32 units		

Cost Breakdown

Item	No	Installed Cost (£)	Total	Comments
TX up to 6.25MVA	4	210,150	840,600	
TX up to 12.5MVA	6	253,150	1,518,900	
TX up to 18.75MVA	18	304,080	5,473,440	
TX up to 20/25MVA	4	354,080	1,416,320	
Cable			822,500	
Sub-total			**10,071,760**	
Technical Design and Project Management			638,098	
Total			**1,079,858**	

Source:

NIE Strategy Paper B3

UR44 spreadsheet

DISTRIBUTION		Project No	D15
NIE Project Title	**Secondary Substations**		
NIE Project Description	Secondary plant includes 11kV & 6.6kV switchboards, distribution substations, sectionalisers, LV pillars, LV switchboards, transformers and distribution substation auxiliaries. This project includes a combination of asset replacement and targeted refurbishment proposals for secondary network plant and equipment. Refurbishment will be carried out as a method of asset life extension in preference to replacement where cost effective.		
NIE Project Justification	The condition of the secondary network assets gives rise to safety issues since the assets are usually located in streets and other public places. They are frequently exposed to vandalism and anti-social activity. While a failure does not present the same level of network risk found with Primary and Transmission plant the issue of public safety is paramount. Those assets considered to pose the greatest risk to public safety will be prioritised for replacement or refurbishment. The work will also include civil upgrades and repairs to buildings to maximise asset life extension.		
NIE Request	£37.808m		
UR Determination Findings	It was not clear in NIE's submission how the threshold for investment was established for each type of equipment or how these were considered to be consistent. NIE's proposals would result in a significant number of 11 and 6.6 kV GMT being replaced ahead of life. Our modelling shows a mean asset life 17 years less than the GB mean. Our determination was based on DPCR5 asset replacement modelling, with an adjustment of 10% on the indirect costs. Please note - subsequent review of the arithmetic has shown that £5.9 million was excluded incorrectly from our final determination. The correct approval amount (based on our methodology) should have been £32.52 million for these works including £1.77 million for consultancy obtained pro-rata based on the original NIE consultancy costs for this project.		
BPI Assessment	BPI appreciates and supports the importance and justification for this project to target assets that may pose the greatest risk to public safety. BPI note from our review of strategy papers, that much of the 11kV and 6.6kV substation plant has Apparatus Operational Restrictions (AOR's) as a result of defects, and in some cases a Dangerous Incident Notification (DIN) via the ENA. Hence as well as the risk to the general public the inherent operational risk to NIE's engineering operatives is also elevated. The majority of 6.6kv secondary switchboards contain Reyrolle switchgear installed between 1940 & 1970, shown in the asset age profile histogram. The SKM modelling presumes that some transformers can be refurbished and reissued and hence have netted off the cost to give a project saving and arrive at a reduced RP5 spend. BPI does not consider this approach to follow GB DNO engineering practice. In reality substations of the age profile concerned are more economically scrapped or could be potentially stored for spares. Hence BPI's view is that this particular assumption should not be applied with the resultant efficiency expectation. BPI has now reviewed the evidence provided both before and subsequent to our draft report. We accept that NIE's methodology will result in some distribution transformers being replaced ahead of need and note that of the 450 substations to be replaced, 305 can be regarded as being close coupled between switchgear and transformer. Given the driver for substation replacement is aged switchgear, then it would seem reasonable to net off the cost of 145 new transformers.		

BPI Recommendation	BPI recommends that the full project should be allowed less the cost of 145 distribution secondary transformers at £7,800 each.

Cost Breakdown

Item	No	Unit Cost (£)	Total (£)	Comments
Replace RMU	60	9770	586,200	
Replace complete s/s	380	32,812	12,468,560	
Replace complete s/s and temp	70	42,978	3,008,460	
Replace switchboard	18	175,000	3,150,000	
Replace OH fed GMT	60	23,307	1,398,420	
Replace H pole	110	15,656	1,722,160	
H pole TX change only	10	3,190	31,900	
H pole replace LV cab	20	8,537	170,740	
4 pole replacement	190	28,136	5,345,840	
4 pole defects	10	28,136	281,360	
Replace sectionalisers	50	11,014	550,700	
Mini pillars etc.	1,170	36,71	4,295,070	
LV wall mounted	50	21,197	1,059,850	
Ancillary systems			2,527,300	
Inspection programme			1,211,430	
Sub-Total			**37,807,990**	
Adjust for 145 transformers	145	7,800	-1,131,000	
Sub-Total			**36,676,990**	
Design and Project Management			2,323,674	
Total			**39,000,664**	

Source:

NIE Strategy Paper C8, C9, C10 and C11

UR44 spreadsheet

DISTRIBUTION		Project No	D17
NIE Project Title	**Distribution Fault and Emergency**		
NIE Project Description	This investment provision is for capital work associated with unanticipated fault and emergency work associated with the 33kV, 11kV, 6.6kV and LV networks which results in capitalised works.		
NIE Project Justification	The NIE network experiences a steady state volume of faults due to a number of causes; inclement weather (wind, snow, and lightning), falling trees, bird strikes, 3rd party accidental damage, deterioration due to ageing or wear, vandalism etc. These failures generally result in interruption to electricity supply to customers. The investment level proposed for RP5 reflects RP4 level outturn experience on a range of reactive investments relating to faults on the overhead network, underground cable system, meter board faults and plant failures on the 33kV, 11kV, 6.6kV and LV networks.		
NIE Request	£12,939,775		
UR Determination Findings	We have accepted NIE's claim for these costs in full, based on historic run rate. We have made an adjustment of 10% to the indirect costs. Given the increase in planned programmes, the volume of faults should decrease towards the end of this period and into RP6.		
BPI Assessment	Although fully agreed by the Regulator (less an efficiency factor) BPI has reviewed Projects D17 and D18 because of representations made by the Regulator in view of our recommendation to increase the RP5 capex for certain asset replacement categories. The Regulator was very clear that in their opinion the capex allowed in both D17 and D18 is effectively a contingency sum and should be regarded as such when analysing overall asset replacement expenditure. This assessment was stated as part of the Regulator's comments in the final determination, viz "Full amount allowed as the overall capex spend is not being increased. Note - if asset replacement increases significantly then this should be reduced as more assets close to failure should be captured by the planned work". The distribution fault and emergency allowance is based on the RP4 run rate and is for the replacement or refurbishment of assets under essentially emergency circumstances. This covers the failure of equipment, including plant, cables and overhead lines caused by damage faults occurring on the system. By definition these are unforeseen events and will be caused by inclement weather, vandalism, and damage or plant deterioration. Table 1 shows the number of capitalised incidents associated with the overhead and underground networks, and for completeness meterboard faults, for 2010/11. As would be expected, the incidents for 09/10 are of the same magnitude.		

Asset	Capex Incidents	% of Total
Overhead lines	979	44
Underground cables	938	42
Meterboard	161	7

Table 1

	Note: a larger number of faults were dealt with under the opex budget. There may be on-going discussions regarding capitalisation policy but BPI's brief does not cover opex so this assessment, by necessity, acknowledges the NIE published capex incidents only. Although we do not have access to NIE fault data, we believe that the majority of overhead line faults and incidents will be due to inclement weather. Falling trees and branches will probably be the next main cause but asset deterioration is unlikely to feature highly. Within these categories we believe it is only tree interference that is likely to reduce as a consequence of additional capex spend within RP5 i.e. overhead line refurbishment and tree trimming to ESQCR. However, we do not believe the planned yearly volumes are likely impact significantly on the number of overhead line faults within the period of RP5 – any reduction is likely to impact towards the end of RP5 and more likely into RP6. The Distribution Cable Project D16 allows for a very modest replacement underground cable assets. We do not believe this will result in a significant reduction in the number of cable faults and hence expenditure within RP5 or indeed into RP6. Based on the RP4 run rate we agree with the proposed expenditure and further do not consider that this will result in sufficient betterment to warrant a reduction in any of the other asset categories.
BPI Recommendation	Full allowance in RP5

Cost Breakdown

Item	No	Cost (£)	Total	Comments
Project Costs			£12,939,775	
Total			£12,939,775	

Source:

NIE

UR44 spreadsheet

DISTRIBUTION		Project No	D18
NIE Project Title	**Distribution Reactive**		
NIE Project Description	The investment plan includes a category of expenditure which includes for a range of works which are not specifically identified under the planned programmes of work. The work is generally reactive to unplanned events, inspections, defect reports and failure investigations and in response to customer requests. It also includes for other services required to support the programmes of work including provision of mobile generators, workshop services and management costs associated with excavation and reinstatement.		
NIE Project Justification	This reactive investment can either; • result in a new programme of work on assets not previously identified for investment during the period; • relate to assets which have failed early; • result in an interim refurbishment programme until full replacement programme can address the requirements in full; This expenditure can be categorised as; • Defect rectification – treatment of urgent defects identified through inspection programmes resulting in replacement or refurbishment of assets. • Minor unanticipated refurbishment at Distribution sites as a result of defects, failures or inspections resulting in minor projects or programmes. • Reactive works identified as a result of customer queries and reports • Workshop activities relating to the plant refurbishment for the capital programme • Provision of mobile generation to minimise customer downtime during distribution substation programmed work The investment level proposed for RP5 reflects RP4 level outturn experience.		
NIE Request	£10,741,578		
UR Determination Findings	We have accepted NIE's claim for these costs in full, based on historic run rate. We have made an adjustment of 10% to the indirect costs. Given the increase in planned programmes, the volume of faults should decrease towards the end of this period and into RP6.		
BPI Assessment	Although fully agreed by the Regulator BPI has reviewed Projects D17 and D18 because of representations made by the Regulator in view of our recommendation to increase the RP5 capex for certain asset replacement categories. The Regulator was very clear that in their opinion the capex allowed in both D17 and D18 is effectively a contingency sum and should be regarded as such when analysing overall asset replacement expenditure. Table 2 shows the various categories of work and the level of capex forecast for each based upon the RP4 run rate.		

Category	Detail	RP5 cost £k
Minor defects	Repair defects identified from S/S inspections	655
Plant workshop	Plant refurbishment	1,285
Mobile generators	Generators installed to maintain supply during programmed work and system faults	755
Excavation and Reinstatement	DRD inspection fees etc.	230
To do	Reactive overhead line work – service and mains defects registered by customers	6,500
General enhancement	Unanticipated refurbishment works at substation sites – enhancement of security, civil repairs and reactive replacement of items and components such as gates, fencing, doors, pumps etc.	980
Total		**10,405**

Table 1

We note the assessment stated as part of the Regulator's comments in the final determination, viz

"Full amount allowed as the overall capex spend is not being increased. Note - if asset replacement increases significantly then this should be reduced as more assets close to failure should be captured by the planned work".

NIE will have a number of reactive items registered during the course of any year. It will be necessary to deal with a proportion of these relatively quickly, particularly any that impact upon safety or customer supplies, and some will be deferred and included within programmed replacement works.

Based on likely reactive work, BPI is of the opinion that the costs associated with each category are of an order of magnitude that would be expected for a distribution network equivalent in size to NIE's. Further, we do not take the view that an increase in asset replacement is likely to reduce this allowance significantly other than for the category "To do" – reactive overhead line work.

An expenditure of £6.5m for this category appears relatively large (requested expenditure for Project D9 – Refurbishment of low voltage lines - is £21.4m). Although we accept that an element of this expenditure will be used for storms remedial work, nonetheless, because we have allowed NIE's overhead line refurbishment volumes in full, we believe that at least a proportion will be captured during the programmed line refurbishment works. Consequently we have reduced this category by roughly a third (£2m) which we believe to be not unreasonable.

BPI	Full allowance in RP5 less reduction of £2.0 million offset against other OHL work

Recommendation	

Cost Breakdown

Item	No	Cost (£)	Total	Comments
Project costs			10,405,000	
Adjustment			336,578	Balancing figure to match original request.
Sub-total			**£10,741,578**	
Reduction			£2,000,000	Due to increase in OHL volumes
Total			**£8,741,578**	

Source:

NIE

UR44 spreadsheet

DISTRIBUTION		Project No	D19
NIE Project Title	**Storms**		
NIE Project Description	The investment plan includes a category of expenditure for the capitalised costs associated with storms on the network. This includes the costs of restoration of supplies though replacement of conductors, overhead line components, substation assets and repairs to underground cable faults. This investment category covers for the occasions where due to the severity of the weather, NIE escalates its Incident Centre to manage such an event (smaller events managed under Distribution Fault and Emergency investment category).		
NIE Project Justification	The NIE network and the overhead network in particular, is subjected to adverse weather which can result in disruption to customers' supplies. Under severe wind, lightning and snow conditions, faults are inevitable due to the significant dispersed overhead line network that comprises 70% of the distribution system. NIE's escalation plan is put into effect when wind gusts are expected to reach 45kts. The extent of damage on the network depends on a number of factors such as wind gusts, wind direction, time of year, duration etc. Experience has shown that it takes a storm with gusts in excess of 50kts before significant numbers of faults are experienced with the majority of the damage being due to the impact of wind borne debris and falling trees. Ice accretion (build-up of ice on overhead conductors) has been a significant issue over the past 2 winters when temperatures down to -20 C were recorded. The weight of ice during ice accretion accompanied by high winds can result in overhead conductors falling. In addition the network experiences unplanned outages due to lightning which can cause damage and failure to overhead connected transformers, cable terminations and switchgear. The investment level proposed for RP5 is based on the average cost of escalated storm events since 2003. It excludes the costs of 'Exceptional' weather events such as the Storm of Boxing Day 1998 or the Easter Ice Storm of 2010. NIE has proposed a 'Force Majeure' condition should apply in these situations and that costs of these events would be recovered outside the regulatory settlement for RP5.		
NIE Request	£2.6m		
UR Determination Findings	We do not consider these volumes to be additional to those included in the asset replacement benchmarking and fault & emergency expenditure. However, we do acknowledge that it may cost more to undertake these tasks in adverse weather conditions, and have included an amount in the "input driven items" to cover the uplift in costs. This is based on the information that NIE has provided to us about the costs associated with storms during RP4 and is estimated to be 20%.		
BPI Assessment	BPI recognises the difficulties NIE faces in dealing with challenging weather related events in localised and escalated system emergencies. This is in common with all GB Distribution Network Operators. Nevertheless, BPI would not expect unpredictable weather events to be treated as a separate capitalised category. It is a matter for the Regulator to consider if this is an appropriate policy approach in future, and any resultant implications for the network operators licence conditions. BPI's view is that this item (by its very nature being unpredictable) makes it a general contingency item and hence should be factored into the reactive work and asset replacement from fault & emergency categories. Hence Network Operators would need to address this risk by factoring it into their submission Request. BPI notes that UR has made some allowance within R&M in respect of additional costs associated with reactive asset replacement and fault and emergency activity.		

	BPI note (from our meeting on the 16th August) that NIE did not propose a capitalised storms project in RP4, and have not found sufficient justification for this to be a separate capitalised item. From BPI's review of the exchanges, we are satisfied there is adequate allowance for storms and storm related work in fault & emergency and reactive capex categories. Our review of projects D18 Distribution Reactive and D17 Distribution Fault and Emergency shows adequate flexible categorises of expenditure to cover for storm costs. Specifically D18 'To do' category has £6.5m allocated to 'reactive overhead line work' also D17 has £12.9m for inclement weather (wind, snow, and lightning) covering faults and plant failures. The opex allowance not covered under the BPI review for storms will be in addition to these sums; hence BPI find there is sufficient funding for RP5 storm costs.
BPI Recommendation	BPI recommends that no separate allowance should be made under this category

DISTRIBUTION		Project No	D20
NIE Project Title	**Distribution Design and Consultancy**		
NIE Project Description	This investment category covers for the direct cost associated with Distribution substation design and project management of capital projects and for certain projects, the use of specialised substation design consultancy.		
NIE Project Justification	The majority of NIE's design capability is in-house and the cost of this in-house design and project management is collated and apportioned directly to the respective capital projects. In addition to NIE's internal design capability, NIE utilises the services of a number of specialised design consultants for production of high level and detailed substation designs. The investment level proposed is based on current RP4 period outturn costs with allowance made for the increased capital programme on distribution substation projects in RP5.		
NIE Request	£6,678,389		
UR Determination Findings	In response to our follow up questions, NIE provided a breakdown of this request by project/programme. We have allocated these costs to the individual projects and have included the associated design and consultancy costs along with the projects. This provides NIE with the flexibility to choose between internal and external resources.		
BPI Assessment	The capital expenditure programme was subject to benchmarking exercise undertaken by PB Power and Frontier Economics. These studies were commissioned by NIE and were reviewed by SKM and CEPA acting on behalf of UR. We have carefully reviewed the information provided and agree with both parties that the GB DNOs represent a suitable source of comparative information to use in benchmarking. In undertaking the benchmarking assessment it was important to ensure that unit costs were compared on a like for like basis. As part of the distribution price review process (DPCR5), Ofgem reviewed costs on a total cost basis, i.e. did not distinguish between direct and indirect costs. Unit costs used included indirect costs closely aligned with work programmes and included : • Network design and engineering; • Project management; • Engineering management and clerical support; and • Vehicles and transport In undertaking the benchmarking exercise the GB DNO information was separated into direct and indirect costs to allow comparison with NIE's unit costs. It is our view that the benchmark costs for indirect costs include an allowance for these items and therefore the unit costs adopted also include such an allowance. We are satisfied that the cost forecasts for individual projects include sufficient allowance for these costs. To provide a separate fund for these overhead costs would be double counting UR's approach to these costs was to include them with the projects to which they relate and we are in agreement with this approach. The requested project management and consultancy costs have been adjusted pro-rata where necessary and added to the relevant projects. The table below summaries the overall position.		

BPI Recommendation	BPI recommend no separate project allowance under RP5 but all project management and consultancy costs are added to the individual projects.

Project Management and Consultancy Costs

	NIE Request	BPI Recomm.
	£m	£m
Transmission		
Asset replacement	2.52	2.27
Load related	1.58	1.18
sub-total	**4.10**	**3.44**
Distribution		
Asset replacement	5.32	5.25
Load related	1.14	0.94
sub-total	**6.46**	**6.19**
Fund 3 and Other Projects	1.45	1.37
TOTAL	**12.01**	**11.01**

DISTRIBUTION		Project No	D21
NIE Project Title	**Post Storm Repairs**		
NIE Project Description	On Tuesday 30 March 2010, Northern Ireland suffered a period of extreme weather causing significant disruption and damage to the electricity network and due to the extent of the damage restoration of supply to customers was a long and very demanding process spread over six days. The weight of the accumulated snow stressed both conductors and poles beyond design specifications in many cases causing failure. In other cases, conductor has been permanently stretched, poles are off plumb and stays have been pulled partly through the ground. These issues require to be addressed to ensure continued compliance with statutory obligations.		
NIE Project Justification	The worst affected areas included the greater Cloughmills region of North Antrim where there was damage at multiple locations on every 11kV circuit within an area of 270 square miles which necessitated extensive repair and rebuilding of the overhead line infrastructure. There are more than 8,000 customers in the affected area. In the period following the storm, 1558 km of overhead line and 115km of 33kV overhead line in the greater Cloughmills area were patrolled. These patrols identified 56 further locations of significant and potentially dangerous defects. All of these defects were subsequently addressed. However, a substantial number of other sites were identified where conductors were permanently stretched. Some of these overhead line sites are more than 1km in length. Non-completion of this remedial work would carry the following risks: • It is highly probable that there are spans where the actual sag is not compliant with the designed values. At these locations it is possible that given a certain set of weather parameters, the minimum stipulated ground clearance may not be met; and • It is also highly probable that most of the 25mm2 conductor has been stretched to the extent that its future sag performance and storm resilience cannot be predicted. It is therefore likely that under moderate electrical or mechanical load, the conductor will fail catastrophically. This work would have to be carried out in parallel with the other overhead line asset replacement programmes due to its nature. However, it will be necessary to closely monitor the condition and performance of this area of network over the medium to long term.		
NIE Request	£2.0m		
UR Determination Findings	SKM have recommended that this work should be included within the overall asset replacement allocation and that a separate amount is not required. We concur.		
BPI Assessment	While BPI does not discount the need for this work and the case bought forward, we consider that this should form part of the asset replacement programme, including refurbishment and re-engineering works. This would also prevent any possibility of crossover between parallel programmes of work and potential for inadvertent 'double counting' of budget allocation.		
BPI Recommendation	BPI recommends that no separate allowance is made for this category.		

DISTRIBUTION		Project No	D22
NIE Project Title	**Airport Road/ Titanic Quarter**		
NIE Project Description	This project is to extend the existing 33/6.6kV substation site at Airport Road and establish a new 110/33kV substation to meet the future demands of the Belfast harbour estate and Belfast City Centre. The new substation will incorporate 2 new 110/33kV transformers and 33kV indoor switchgear. This 33kV distribution project is linked with the associated 110kV transmission project		
NIE Project Justification	Growth in electrical demand associated with the development of the Titanic Quarter at Queens Island, Belfast Harbour Estate, Bombardier and Belfast city centre is forecast to add approximately 20MVA to the 33kV network by 2017. The existing 33kV city centre network is already operating at 90% of its firm capacity during times of peak load. The distribution network supplying the harbour estate and Titanic site is also approaching capacity limits. Customer contributions have allowed the development of the local infrastructure but deep reinforcement, in the form of a new 110kV injection point, is now required if network security and compliance with license standards are to be maintained.		
NIE Request	**£2,260,000**		
UR Determination Findings	Reduced as we believe NIE does not fully apply the connection charging rules. (should be charged for LCTA excluding other flows) Public perception of the allocation of costs associated with the Belfast Harbour Commissioners is vital since the appointment of NIE's chairman to the Harbour Commission. Full and detailed analysis of the cost allocation of this scheme is essential. Evidence provided to date is not detailed enough.		
Deliverables	Extend the existing 33/6.6kV substation site at Airport Road and establish a new 110/33kV substation comprising 2 new 110/33kV transformers and 33kV indoor switchgear. This 33kV distribution project is linked with the associated 110kV transmission project. Project as described in Submission Appendix A2 Pg.67		
BPI Assessment	This is the Distribution part of the overall project which includes Transmission project T27.The Strategy Paper A2 outlines possible technical options and the need for the project to support future growth in a redeveloped part of the city. There are still some doubts about timing of demand and confirmation from prospective developers and perhaps some of the doubt, which NIE recognise, seems to hinge on the potential connection cost of being the first development and taking on a disproportionate amount of the overall cost. It might be fairer to find a method to split the costs over more potential customers. There is little doubt from UR that this project should go ahead and seems to be a matter of timing. BPI believes that the 50% does not reflect the project cost breakdown with at least £1.8m required for the Transmission Transformers alone. It is our recommendation to allow the full project amount in RP5 subject to confirmation from NIE that the demand is still justified and the whole project can be completed within the period.		
BPI Recommendation	Allow expenditure in RP5		

Cost Breakdown

Item	Cost (£)	Comments
2 New 110/33kV Transformers & Associated 33Kv indoor switchgear	2,260,000	Project cost detailed in Strategy Paper A2 Table 1 Page9. No further breakdown provided
Technical Design and Project Management	143,182	
Total	**2,403,182**	

Source: NIE Strategy Paper A2, UR44 Spreadsheet.

DISTRIBUTION		Project No	D27
NIE Project Title	**Dungannon 33kV switchboard**		
NIE Project Description	This project involves the construction of a second 110/33kV Bulk Supply Point at the existing Dungannon Main substation site. The existing demand will be shared across the two substations. This 33kV distribution project is linked with associated 110kV transmission project.		
NIE Project Justification	This project is primarily the distribution element associated with a transmission driven project. Demand at the Dungannon BSP site has increased causing a potential overload of the existing transformers under an N-1 scenario. Peak site demand is also approaching the rating of the existing 33kV switchboard. A second BSP will be established on the same site to supply the 33kV network feeding north towards Cookstown.		
NIE Request	£1.12m		
UR Determination Findings	This distribution investment is triggered by a need for work on the transmission network. The fault (N-2) scenario identified by NIE for the associated transmission project is not considered to be credible. We have therefore not included funding for either the transmission work or this distribution component of the project in our final determination. While this could be reassessed under the updated planning standards, we do not consider it appropriate to include such an unlikely project in the provisional amount for Fund 2.		
BPI Assessment	From the evidence presented on the related project T32, BPI found that there is not a sufficient case at present to support the related transmission project, although the risk of failure and consequences are noted. As this project represents the distribution element of the transmission project T32 our findings conclude project D27 should not be approved in this price control by default. A reassessment the project for RP6 with more detail of condition and load forecast as well as network implications would be recommended.		
BPI Recommendation	No allowance in RP5		

DISTRIBUTION		Project No	D36
NIE Project Title	**33/11kV Transformers**		
NIE Project Description	This project involves a range of strategies to relieve highly loaded 33kV/11kV and 33/6.6kV transformers at 15 sites. The strategies include transformer replacement, transformer relocation, transformer capacity enhancement and load transfer through lower voltage network reinforcement.		
NIE Project Justification	Out of a total of 224 primary substation sites, the peak demand at 15 sites is forecast to increase over RP5 to a level beyond the emergency rating of the individual transformers. At two of the sites, transformers will be replaced under the transformer Asset Replacement Programme due to their age and condition. At the remaining 13 sites, remedial action, in the form of transformer replacement, transformer enhancement, transformer relocation or load transfer is proposed dependant on individual site circumstances, i.e. the optimum solution is sought in each case.		
NIE Request	£4.462m		
UR Determination Findings	NIE requested funding for work at 15 sites. It has provided evidence to justify work at 5 of these locations. We have included these within our final determination. The remaining items could be logged up if need can be demonstrated based on the updated planning standards. Consultancy costs have been calculated on a pro-rata based on the number of 33/11kV transformers included.		
BPI Assessment	Table 4 of NIE Strategy paper B3 details the load related upgrade plan for the 15 33/11KV and 33/6.6kV transformer sites. Of these sites Springtown and Carrowdore will be replaced as part of the Asset Replacement Programme due to condition and age. NIE's Strategy Paper A2 sets out its methodology behind the distribution load forecasting process to provide a degree of confidence by comparison with GB DNO, in reaching its investment Request. NIE contend that the load flow analysis indicates that 15 sites either are or will be over firm by the end of DP5. Based on the 2011/2012 demand overloaded transformers are at Omagh West, Drumcairne, Ballyfordin, Moypark and Claudy Central. The Utility Regulator appears to have allowed these sites that are currently where the firm rating has been exceeded. NIE's assessment of the 33kv Network is based on:- - Forecast demand until the end of RP5 - Contingency analysis based on load flows - Identification of excessive fault levels - Selection optimised outcome from costed solutions - Impact of existing local generation and demand suppression - Compliance with P26 Standard for supply security BPI recognise that load related growth forecasting is often an area of debate and can change over time, for example NIE's own forecast for demand at Drumcairne Central and Omagh West were advised by NIE to be operating above capacity at draft determination, demonstrating the estimate to be conservative. However in many of the cases, the maximum demand above firm capacity predicted in 2017 is extremely marginal and indeed, even if it does materialise, it may only be for		

	relatively short periods. Consequently we believe there is a case for allowing the expenditure at the five sites identified by the regulator and in addition at another four sites where predicted demand will be in excess of the firm capacity plus 10% in order to exclude some of the more marginal cases. We have allowed for full replacement costs as the original plan included re-use of transformers for sites which have now been disallowed.
BPI Recommendation	Allow expenditure at nine sites.

Cost Breakdown

Item	No	Cost (£)	Total	Comments
Carrick North	2	305,000	610,000	
Coleraine West	2	305,000	610,000	
Malone	1	250,000	250,000	Load transfer
Omagh West	1	250,000	250,000	Load transfer
Drumcairne	1	211,000	211,000	
	1	80,000	80,000	TX enhancement
Ballyfodrin	1	211,000	211,000	
Moypark	1	211,000	211,000	
Claudy Central	2	211,000	422,000	
Glenavy	1	211,000	211,000	
Total			**3,066,000**	
Technical Design and Project Management			194,246	Pro-rata request from NIE full project against this allowance
Total			**3,260,246**	

Source:

NIE Strategy Paper B3

UR44 spreadsheet

DISTRIBUTION		Project No	D43
NIE Project Title	**The Electricity, Safety, Quality and Continuity Regulations 2002 (ESQCR)**		
NIE Project Description	The Electricity, Safety, Quality and Continuity Regulations 2002 (ESQCR) came into force on 31st January 2003 in Great Britain and were further amended in 2006. They replaced the GB Electricity Supply Regulations. The regulations currently apply to public and private operators in England, Scotland and Wales and are about to be introduced in Northern Ireland. These regulations specify safety standards and are aimed at protecting the general public and consumers from danger. In addition, ESQCR specify power quality and supply continuity requirements to ensure an efficient and economic electricity supply to consumers. The paper describes the introduction of similar legislation in Northern Ireland and the financial implications.		
NIE Project Justification	On the introduction of ESQCR in GB, Network operators (NOs) were given a period of five years in which to carry out a formal risk assessment of their overhead line network and a period of up to ten years in which to carry out any remedial works although high risk sites are to be rectified as soon as is practicable. It is anticipated that similar regulations and timescales will apply in Northern Ireland. A new requirement is for network operators to establish a formal risk register of their assets. ESQCR also stipulates a range of specific requirements such as the position and insulation of lines and the provision of danger signs, anti-climbing devices and stay insulators. The primary drivers in this asset category are legislative changes. Key activities planned for are as follows:- • £0.75M Asset Register development cost • £3.5M for 10 patrollers to conduct asset surveys • £84,509,634 Remedial work fitting of safety signage & equipment • £4,860,200 Vegetation management • £1,766,400 Public awareness **Total ESQC Compliance Project Estimate:£95,206,234** This project is phased based on a percentage of work prioritised and allocation of remedial works as follows:- **RP5 – £23,000,000 RP6 - Balance**		
NIE Request	£23.0m		
UR Determination Findings	NIE requested a very substantial amount of funding, based on a high level estimate of the volume of work that might be required and the solutions that might be appropriate. We accept that some work will need to be undertaken, however NIE has assumed more costly solutions to some issues than were considered necessary in GB and work that has been undertaken to the same standards as GB (where this legislation already applies) has been ignored. NIE is already being funded for a full survey of all its assets under the rolling programmes of asset replacement, and we expect ESQCR data collection to be included within these surveys, as would be considered efficient. The cost of surveys and tree cutting has been benchmarked against GB, where these costs are already incurred.		

	We have included £1million in the "input driven items" to cover the risk assessments and any specific surveys that cannot be undertaken by the staff conducting routine surveys. We expect all asset replacement work under Fund 1 to be undertaken to a standard that complies with this legislation.
BPI Assessment	It is evident from NIE's Capital Expenditure Strategy Paper that a full potential impact assessment of compliance with ESQCR legislation has been considered. The assessment is based on "recent trial ESQCR patrols" (Ref Strategy Paper F1), the paper does not elaborate on the quantum of surveys conducted and how the sampling has taken place. BPI cannot conclude if this is representative of the level of compliance of the entire network to arrive at a total cost of £95,206,234 (RP5 & RP6). This total cost appears high for a reasonable electricity transmission / distribution company operating within legislative obligations. Northern Ireland would also have had the benefit of learning form the GB introduction of ESQCR 2002 which came into force on 31st January 2013, with further amendments in 2006. This would to some degree help the industry prepare for its introduction, as would trade bodies such as the Energy Networks Association (ENA). Considering the role out of ESQCR being similar to GB, with five years in which to carry out a formal risk assessment of and a period of up to ten years in which to carry out any non-urgent remedial works, BPI's view is that NIE's compliance cost appears to be significantly high than expected compared to GB. It is debatable if this is due to the network being less compliant or that NIE's initial assessment has this risk weighted significantly high based on initial sampling. BPI's view is that the funding priority sits with gathering actual detailed survey findings, to aid prioritisation form risk assessment and to build a clearer view of actual proposed volumes of work. Whilst NIE have made efforts to ensure only the costs directly attributed to ESQCR have been attributed, BPI's view is that there would be economies of scope efficiencies that DNO's would be looking to leverage to include ESQCR compliant activities. For example stipulating use of compliant tree cutting contractors, amending, evaluating and prioritisation of public awareness campaigns by their effectiveness and performance improvement plans to comply with PASS 55 and enhance existing asset management systems. It should be noted that Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012, help bring greater focus on risks to public safety that would already be part of the Network Operators existing network management licence obligations. The Utility Regulator has allowed £1M for the data gathering activity but detail of how this arrived at is not evident. Therefore BPI has used the forecasted costs based on NIE's strategy paper F1. In conclusion, Based on the NIE paper F1, BPI consider the allowance for RP5 cost for:- • Development of Asset Register (Split 90% Distribution & 10% Transmission) (£750,000 (Ref 3.1 Paper F1)) (Split is calculated from number of structures Paper F1 Table 1 page2) • Additional patrolling costs (above the existing inspection cycle) (£3.5M (Ref 3.1 Paper F1)). Note NIE's paper (page 2) notes no additional transmission patrollers will be needed due to current work content and phasing. BPI considers the bulk of any remedial ESQCR compliance should be determined based on actual data and records completed in RP5. The findings can then be presented in the next review period.

Revisions resulting from Competition Commission Hearing Meetings Friday 16th August and Thursday 5th September.

Because of the representations made by NIE and the Utility Regulator we have reviewed our recommendations made to increase capex in project D43, which includes 10 patrollers to conduct ESQCR survey work in RP5 amounting to a cost of £3.5m

BPI Analysis on Population of ESQCR Assessments:

Total overhead line length (LV,6.6/11,33,110kv and 275kv)= 30,600km

Assuming completion is linear over 5 year period 30,600/5 = 6120km of lines to patrol per annum

From BPI's information on GB DNO a single patroller should cover 4km per day

Based on 220 days per year (excluding sickness and holidays) = 880km per man year

6120/880 = 6.95 or 7 patrollers required to complete the DPCR5 programme.

7/10 x £3.5m = Revised patrolling costs of £2.45m

Form our review of NIE's strategy on overhead lines we have learned that "*The objective of the refurbishment programme is that each overhead line circuit would be refurbished every 15 years, with the replacement of those major components identified as being defective".*

We also know that "*A detailed line patrol, carried out in the year prior refurbishment, identifies those components whose condition is such that they are in need of replacement. This condition assessment also includes known failure modes such as stirrups and binders, which are identified for replacement."* (Reference NIE Strategy paper D3, p9).

From this BPI conclude that a third of the overhead line assets are visited every five years or each review regulatory period as part of NIE's routine patrolling programme.

While we acknowledge the costs associated with remedial actions necessary to comply with ESQC regulations are not included here, we see no reason why the scope of the patrolling cannot be extended to include ESQCR assessment. BPI expects the Utility Regulator would not consider it efficient to patrol the same asset under two separate programme of work. We have therefore applied an adjustment to reflect the economy of scope operational efficiency, of merging the ESQCR patrolling with planned routine line patrolling.

Hence the final calculation reduces the patrolling costs by one third

2/3 x £2.45m = **Final total patrolling cost (including economy of scope) £1.63m**

Final total allowance = £675k (D43 asset register costs) + £1.63m = £2.3m

BPI also understands that the UR allowance for reactive work can cater for urgent compliance works from the findings of the survey work allowed for in BPI's assessment. Finally BPI reserves its recommendation on ESQCR expenditure unless the Competition

	Commission advise on any quantum to be adjusted based on their legal advice.
BPI Recommendation	BPI recommends that NIE should conduct the full survey work and create the asset register. The asset register will be shared with Transmission and will be part funded (10%) by Transmission projects.

Cost Breakdown

Item	No	Cost (£)	Total(£)	Comments
Full survey		1,630,000	1,630,000	Additional to other survey work and patrols
Asset Register		675,000	675,000	Divided 90/10 between Distribution and Transmission.
Sub-total			**2,305,000**	
Pro-rata Technical Design and Project Management				None requested
Total			**2,305,000**	

Source:

NIE Strategy Paper F1

NIE Strategy Paper D3

UR44 spreadsheet

DISTRIBUTION		Project No	D45
NIE Project Title	**Distribution Capitalised Overheads**		
NIE Project Description	Allocation of overheads associated with cost areas and involved in the delivery of capital projects. The proportion of overheads capitalised is based on the activity levels within these areas between work which is capital in nature and that which is revenue in nature.		
NIE Project Justification	International Accounting Standard 16 'Property , Plant and Equipment' (IAS 16) states that the cost of an asset will include any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. The overheads identified directly relate to capital projects and therefore it is appropriate that these costs are capitalised.		
NIE Request	£23,568,000		
UR Determination Findings	In response to our follow up questions, NIE provided a breakdown of this request by project/programme. We have allocated these costs to the individual projects and have included the associated design and consultancy costs along with the projects. This provides NIE with the flexibility to choose between internal and external resources.		
BPI Assessment	The capital expenditure programme was subject to benchmarking exercise undertaken by PB Power and Frontier Economics. These studies were commissioned by NIE and were reviewed by SKM and CEPA acting on behalf of UR. BPI has carefully reviewed the information provided and finds that the GB DNOs represent a suitable source of comparative information to use in benchmarking. In undertaking the benchmarking assessment it was important to ensure that unit costs were compared on a like for like basis. As part of the distribution price review process (DPCR5), Ofgem reviewed costs on a total cost basis, i.e. did not distinguish between direct and indirect costs. Unit costs used included indirect costs closely aligned with work programmes and included : • Network design and engineering; • Project management; • Engineering management and clerical support; and • Vehicles and transport In undertaking the benchmarking exercise the GB DNO information was separated into direct and indirect costs to allow comparison with NIE's unit costs. However, there remains a lack of clarity about the comparability of NIE's costs and benchmark data, particularly with the use of Power team rates and we understand that a further benchmarking exercise is being undertaken to consider the efficiency of NIE's indirect costs. Whilst we are not convinced of the need for a separate allowance for these costs in addition to the costs already allowed for in other projects, we recommend that a final decision on should be made after the conclusion of that work. In preparing our draft report we scaled the Final Determination allowance in direct proportion to the total amount of capital expenditure on the basis that whilst in the short term costs may be fixed in nature, over the longer term, they are variable.		
BPI Recommendation	Pending the outcome of the benchmarking of indirect costs, BPI recommends an allowance of £17,696,562. This is based on the pro-rata difference between the Final Determination and BPI's Assessment based on sum of Fund 1 and Fund 2.		

DISTRIBUTION		Project No	D48
NIE Project Title	**11kV Network Performance**		
NIE Project Description	At a total cost of £9m, remote control facilities will be provided on 500 devices on 200 circuits and earth fault indicators (EFI's) with SCADA facility will be installed at 1000 locations on the network during RP5. RP5 will continue with the present strategy of applying remote control to strategic devices on the rural network. NIE would expect to apply remote control to 40 rural circuits per annum during RP5. The performance improvement technique proposed for the 11kV urban network during RP5 is based on providing Earth Fault Passage Indicators (EFI) with SCADA facilities.		
NIE Project Justification	An improvement in network performance is required if NIE customers are to receive a similar quality of supply as other customers in the UK. It will also assist Northern Ireland to remain competitive and attract inward investment. Consideration of the most effective methods that may be adopted for improving network performance is therefore required. The most cost effective means of improving network performance is to provide remote switching facilities for the rural overhead lines to allow supply to be restored from control centres following a fault; and earth fault passage indicators on urban circuits that will facilitate faster fault location and subsequent isolation Based on initial estimates, it is expected that this will deliver a performance improvement of 5 CML by 2016/17, the final year of RP5.		
NIE Request	£9.0m		
UR Determination Findings	NIE has not provided any evidence to show that customers are unhappy with the current standard of network performance or that customers would be willing to fund improvements to network performance. Our own experience of customers contacting our office is that they are significantly more concerned about the cost of electricity than quality of their current supply.		
BPI Assessment	Remote control devices and Earth fault Indicators with a SCADA facility will no doubt help improve NIE's Customer Minutes Lost statistic. After a fault has occurred on a circuit leading to operation of the source circuit breaker, identification of the faulty element is essential to the process of restoring customer supplies. For clarity, network performance is expressed in terms of Customer Interruptions (CIs) and Customer Minutes Lost (CMLs) CIs depend on the number of faults on the network and the number of customers affected by each fault. CMLs depend on the number of customers affected and the length of time to restore supply following a fault. Customer Minutes Lost is the measure of the duration of interruptions to supply each year measured by the average customer minutes lost per customer. For 2012/2013 NIE's CML performance was 53.1 for unplanned outages comparing with an average about 55 for the DNOs within Great Britain. Also, in all of the DNOs (excluding London) customers connected to overhead networks experience a considerably poorer performance and in this respect NIE is no different		

	Earth fault indicators connected via SCADA can help assist the Control Engineer in determining the location of the fault and then remote operation of isolating facilities generally means that large numbers of customers can be restored swiftly without recourse to an engineer on the ground. Prior to this type of system, operation of an Earth Fault Indicator would have been identified manually at a number of sites and then network sectionalising carried out, again manually, by an engineer travelling between switches. However, attendance by an engineer to carry out at least some switching operations and determine the precise cause of the fault is almost always required – although SCADA remote operation is an extremely useful tool for restoring customers' supplies, nonetheless efficient processes for organising emergency response teams should not be overlooked when looking at performance improvement measures. The Regulator believes that customers are more interested in the cost of electricity rather than improvements in network performance. Indeed although this expenditure would no doubt improve (lower) the Customer Minutes Lost, it is unlikely the difference would be substantive enough to be recognised by customers generally. NIE currently has performance indices that compare favourably with the DNOs and it may be possible for these to be improved upon by operational processes without further expenditure.
BPI Recommendation	No allowance in RP5.

DISTRIBUTION		Project No	D49
NIE Project Title	**Smart Grid**		
NIE Project Description	Application of smart technologies is necessary to address the challenges in meeting Government's targets for sustainability, including the move towards a low carbon network. This project is looking at funding a range of smart technology trials that will enable further connection of renewable generation onto the distribution network, maximise the utilisation of existing network assets and developing active distribution networks. • NIE has identified several trials to deploy smart approaches during RP5 to: • The management of system transformers and cables • Network optimisation for the purpose of deferring load-related investment • Active control of voltage and reactive power within interconnected 110kV networks • Dynamic ratings for system transformers and overhead lines • Develop a distributed network control approach where control of the network is relegated to automated controllers within subsets of the network i.e. micro grids		
NIE Project Justification	The challenges that are to be faced in the future in terms of accommodating the changes arising from renewable energy resources and the growth of emerging low carbon technologies (e.g. electrification of the heating and transport sectors etc.) will require a significant change in the design and operation of the network and the most cost-efficient manner to facilitate this change will mostly arise through embracing smart technologies. Ofgem has introduced funding incentives in GB to provide a head start in trialling, developing and applying smart technologies comprising of the Innovation Funding Incentive (IFI) and the Low Carbon Networks Fund (LCNF). While there is no desire to duplicate research already taking place in GB into smart technologies, NIE recognises the need to carry out our own trials and development of technologies which are suitable to the NI network with NIE's current systems in place to manage the operation of the network and assets. To achieve this, NIE is seeking support from the Utility Regulator broadly in line with the funding incentives provided by Ofgem for GB DNOs.		
NIE Request	£9,350,000		
UR Determination Findings	Some of the costs requested by NIE under this heading are related to transmission projects T13 and T14. These items have been included under those projects. The remaining request does not address the issues that we are facing in Northern Ireland which are most appropriate for smart grid solutions, for example small scale renewable generation connected to the distribution system and surplus renewable generation at off-peak times. We have not included funding for the distribution work requested by NIE, as this would remove the opportunity for more beneficial schemes to be progressed. We have instead, left the way open for more appropriate schemes to be developed through Fund 3. We note NIE has already presented some ideas for these schemes to the renewables grid liaison group and is working with ESB networks to obtain EU TENS funding for a cross border smart grid project. We expect any smart meter trials to be scoped out and funded via the smart meter roll out programme.		

BPI Assessment	Although we have increased the expenditure for grid transformer replacement in projects T13 and T14, we believe smart approaches to the management of transformers will assist NIE to more effectively manage the remaining population. Further, this should provide NIE with valuable inputs into its asset management decision making process resulting in more accurate targeting of transformer replacement expenditure into the future. We accept the Regulators determination that other expenditure for smart grid solutions should be developed through Fund 3 as it relates mainly to renewable projects.
BPI Recommendation	Allow £3.0m for transformer monitoring. Allowed in T13 and T14.

Cost Breakdown

Item	Cost £	Comments
Smart Grid solutions	3,000,0000	
Total	**3,000,0000**	

Source:

NIE Strategy Paper F7

UR44 spreadsheet

DISTRIBUTION		Project No	D50
NIE Project Title	**Distribution Substation Flooding Enforcement**		
NIE Project Description	Programme to provide permanent protection to several Primary Distribution substations that are at risk from flood events.		
NIE Project Justification	This programme plans to address the risk posed by flooding to NIE's Primary Distribution sites. All NIE Primary Distribution substations were assessed during 2008 by NI Rivers Agency and Total Flood Solutions. Overall, thirty seven substations were assessed as being at risk from a flood event which could require the substation to be de-energised for safety. The flood risk is such that permanent protection is required for twelve sites. This protection will cover the main substation building, transformers and any external marshalling kiosks or protection/control cubicles. At the remaining sites a combination of temporary and semi-permanent measures will be used.		
NIE Request	£2,075,000 as based on reconciliation spreadsheet from NIE. Full request in Strategy paper was £2,585,000.		
UR Determination Findings	Only sites with historic flooding allowed Lurgan west Maydown Newry North Newry south Sprucefield Other sites do not appear to be within the flood risk areas based on the mapping provided. (simply close to them)More specific information provided at an appropriate scale is required for any logging up to be allowed. (ref to height of flood AOD and substation level AOD to establish need) No site specific costs provided therefore allowance pro-rata 5 out of 35		
BPI Assessment	In BPI's review of this project, the significant point of consideration is the approach to accepting material risk of flooding. BPI notes that NIE Strategy Paper C14 (page 11), states that currently Northern Ireland has no flood warning systems. Taking this on face value, this would reduce the effectiveness of temporary (and less costly) protection measures that are normally deployed following a flood warning, in favour of permanent protection. It therefore is reasonable to target the highest probability of actual flooding. These are identified as:- • Lurgan West • Maydown • Newry North • Newry South • Sprucefield UR has allocated a pro rata allowance of £311,250 against the above sites. However the flood protection costs identified in NIE's Strategy Papers C2 and C14 would suggest that the flood protection costs associated with the five identified sites is significantly higher than the pro rata allowance made. Paper C14 Table 4: Lists fifteen (15) targeted Primary Transformers at a total of £2,575,762. There is also information identifying individual sites at a cost of between £150k and £180k. There have been a number of representations and documentation issued which include the topic of flowing. BPI has the following observation to make:- • The utility regulator has found the maps showing the proximity of flood plain to the transformers to be unclear. (Ref-UR107p11) • As part of the European Floods Directive, introduced as the Water Environment		

	(Floods Directive) Regulations (Northern Ireland) 2009, the NI Rivers Agency is to identify areas of risk and produce flood hazard maps by the end of 2013. • Following on from this a flood risk management plan is due to be produced by the end of 2015, which may lead to a warning system.(Ref: Meeting Actions and NIE responses, 29 Aug, p34) BPI's view is that this may lead to greater clarity on flood risk and it may be appropriate for NIE to re-examine temporary and more permanent solutions at this point. In the interim BPI believe this assessment is reasonable and provides adequate funding to address this proposal during RP5.
BPI Recommendation	Based on the information available, BPI recommends an allowance of £170k per site for the five most urgent sites identified.

Cost Breakdown

Item	No	Cost (£)	Total	Comments
Flood defences	5	170,000	850,000	
Sub-total			**850,000**	
Technical Design and Project Management			53,851	Pro-rata with full request,
Total			**903,851**	

Source:

NIE Strategy Paper C2/C14

UR44 spreadsheet

DISTRIBUTION		Project No	D56
NIE Project Title	**25mm^2 Conductor Ice Accretion**		
NIE Project Description	Reference – NIE Paper „THE RESILIENCE OF THE NIE 11kV OVERHEAD LINE DISTRIBUTION NETWORK TO EXTREME WEATHER EVENTS, 2nd Draft, 2 Dec 2011". This paper discusses the nature of the problem, the quantification of risks, risk mitigation options, contingency planning and stakeholder consultation. Full details of volumes and costs and the impact on the 11kV overhead line TAR, refurbishment and reengineering programmes are tabled in the report and the associated covering letter. Over the last decade severe weather events in Northern Ireland have caused ice accretion on distribution overhead lines with resultant pole and conductor damage and consequential loss of electricity supply to significant numbers of customers. In particular a snow storm in February 2001 affected the networks in the southern part of Co. Down with a loss of supply to customers for up to 3 days; and a more recent snow storm in March 2010 caused significant damage to the overhead networks in the greater Cloughmills area of Co. Antrim with customers being off supply for 6 days. These events have highlighted the risk of network failure in such adverse weather conditions resulting from the widespread use of small cross section conductor on the 11kV overhead network. This project will bring the design of the entire network up to the current specification which requires a minimum conductor size of 50mm2.		
NIE Project Justification	The current asset management strategy prioritises network refurbishment based on asset condition assessments and this strategy has resulted in a significant improvement to network performance since privatisation. However this strategy cannot adequately address the ice accretion risk. This is because overhead line conductors have a long life, usually of the order of 60 to 70 years, and only a small length of condition based conductor replacement and line rebuild has been carried out to date. Although it is recognised that the amount of condition based replacement has to increase, the rate proposed would lead to the replacement of 20% of 11kV main line only (spur lines would not be rebuilt) in the next 10 year period and this is insufficient to address the risk outlined in the 25mm discussion paper. A change of asset management strategy is therefore required and the preferred course of action is the commencement of an overhead line rebuild programme to current standards		
NIE Request	£35m		
UR Determination Findings	NIE has submitted a request to completely rebuild the 11kV network over 15 years, to respond to a specific high impact low probability event. It has not provided any information to suggest it has considered alternative options to respond to this type of incident or undertaken any consumer engagement to ascertain customer support for such a fundamental and costly rebuild. We are aware of other reasons why some of these wires might need to be rebuilt to connect individual small scale generation. However under the connection charging policy, these costs should be charged to the connecting party not to the RAB. All conductors are subject to the risk of ice accretion. Much larger diameter wires (such as the Coolkeeragh to Magherafelt line - project T18) have failed as a result of this. NIE has not provided evidence to quantify the improvement in performance that would be achieved by this massive investment. In these circumstances we could not endorse a change of this magnitude.		

BPI Assessment	Although it was no doubt recognised by NIE that small cross sectional area conductors were more prone to damage from ice accretion than larger types, it seems to have been the three snow events between 2001 and 2010 that focused NIE's attention on its sizeable 25mm^2 SCA overhead line network. In January 2011 NIE submitted a paper to the Utility Regulator which was prompted by an increasing concern (arising out of three events between 2001 and 2010) of the risks to electricity supplies when ice or wet snow forms on conductors (ice accretion), particularly on older sections of the 11kV overhead line network constructed with small section 25 mm^2 conductors. The additional weight of ice on the conductors has the potential to 'birdcage' and ultimately stretch them until they break and the whip lash action causes the poles to break also possibly with a cascade effect resulting in widespread and prolonged loss of supplies to customers. Subsequent to the 2011 paper NIE carried out further investigations into the likelihood of such events together with possible measures to mitigate their impact. Various meetings were held between NIE and UR to discuss the issue resulting in a request by UR that NIE investigate further the possibility of shortening spans between poles as an alternative to a complete rebuild with larger conductor. A second report was submitted in December 2011 - Reference – NIE Paper „THE RESILIENCE OF THE NIE 11kV OVERHEAD LINE DISTRIBUTION NETWORK TO EXTREME WEATHER EVENTS, 2nd Draft, 2 Dec 2011". Notwithstanding NIE's concerns about the resilience of its 11kV overhead line network during extreme cold weather events it should be remembered that ice accretion is a relatively rare occurrence. Although NIE contend that the March 2013 event was the fourth such event in a 12 year period (and the third in a three year period) nonetheless, due to the number of variables, significant ice loading of overhead line conductors is regarded as a low probability event within the United Kingdom electricity supply industry. It also tends to be rather geographically localised and so generally only a relatively small part of a DNO's network is likely to be affected when such an event occurs. It is also important to note that NIE do not consider that the quantity of 25 mm^2 conductor on the network is having a fundamental impact on network performance in terms of average weather. Additionally, although overhead lines using small diameter conductors are more prone to damage due to their lower mechanical strength, larger diameter conductors can and do suffer damage. NIE's original submission for RP5 was£127m (approximately 186% of the 11kV overhead line refurbishment budget). NIE hold the view that the 25mm2 conductor remains a major issue with the resilience of its 11kV overhead line network and is advocating a pilot study amounting to £35m, to determine the scope and cost of delivery should be carried out in RP5. It is difficult to see what benefits, other than the obvious one of uprating specific aged 25mm^2 conductors to new 50mm^2, a pilot study would provide. NIE, as part of its asset replacement works (D8), will refurbish 11kV overhead lines. Its RP5 re-engineering specifically targets rebuilding sections of line with a history of poor performance and many of the issues associated with the replacement of 25mm2 conductor will most likely be encountered during these projects. Indeed it is likely that some sections of 25mm2 conductor will be replaced during the refurbishment programme and so scope and cost issues can broadly be assessed at this time In conclusion because of the low probability of severe cold weather events and in particular ice accretion, we do not accept that wholesale replacement of 25mm2 conductor with that of 50mm2 would significantly improve the overall performance of the 11kV network for the majority of NIE's customers. Further, the benefits of a study which in cost terms amounts to roughly 50% of its RP5 11kV overhead line submission, are dubious at best and in all likelihood would provide no more information or data to that already available.
Recommendation	BPI recommend no allowance for RP5