OFGEM

GAS DISTRIBUTION PRICE CONTROL REVIEW

FIVE YEAR CONTROL

(OPEX)

REPORT 2

NORTHERN NETWORK

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1 EXECUTIVE SUMMARY

1.1 OPEX

PB Power has reviewed the submission by Northern Gas Networks (NGN) for the direct controllable operating cost allowances for the Northern network for the period 2008/09 to 2012/13, and sets out in this report its proposed cost projections, and the reason for any changes to NGN's submission.

Direct controllable operating costs are the total costs of operating the following:

- Direct activities (Work management, emergency service, repairs, maintenance, other direct)
- xoserve
- Shrinkage

For each activity, we have identified the benchmark activity costs by examining the unit costs in the base year (2005/06). Setting the level of the benchmark unit costs has also been informed by NGN's forecast costs for 2006/07. When the actual operating costs for 2006/07 are known, we will review our proposals and make adjustments if appropriate. The analysis also reviewed GDN's forecast costs for 2008/09 to 2012/13 to identify any trends and movement in costs.

This report makes proposals for Northern's direct operating cost allowances for the next price control period (2008/09 to 2012/13). In this report we have made adjustments to bring NGN's forecast expenditure towards the benchmark. In most cases our proposed costs reach the benchmark before the end of the price control period

Our proposals and NGN's submission are summarized in the following chart and table

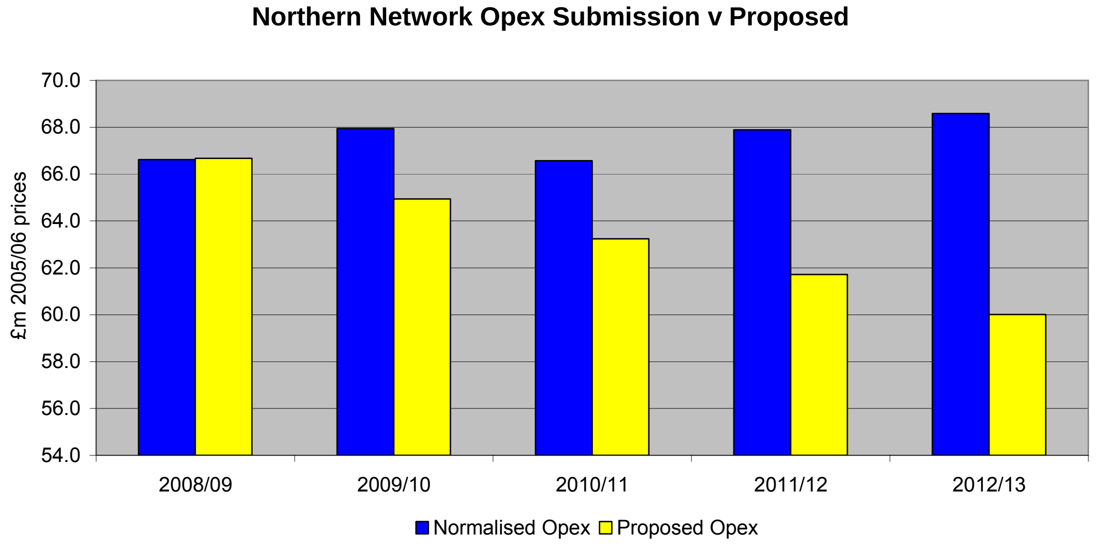

Figure 1-1

Northern Network Net Opex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission						
Work Management	23.0	23.9	21.4	21.6	21.5	**111.4**
Emergency	7.7	7.7	7.8	8.2	8.4	**39.8**
Repairs	10.6	10.9	11.0	11.2	11.4	**55.1**
Maintenance	12.7	12.8	12.9	13.2	13.4	**65.0**
Other Direct Activities	18.0	16.7	18.9	18.8	17.6	**90.0**
Shrinkage	0.0	0.0	0.0	0.0	0.0	**0.0**
xoserve	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**72.0**	**72.0**	**72.0**	**73.0**	**72.3**	**361.3**
Normalisation Adjustments						
Work Management	-1.7	-2.1	-1.7	-1.8	-1.8	**-9.0**
Emergency	0.1	0.1	0.1	0.0	0.0	**0.3**
Repairs	-0.2	-0.2	-0.2	-0.2	-0.2	**-1.0**
Maintenance	-1.7	-1.7	-1.7	-1.7	-1.7	**-8.5**
Other Direct Activities	-16.0	-14.5	-16.7	-16.6	-15.4	**-79.3**
Shrinkage	10.9	11.2	11.6	11.9	12.1	**57.7**
xoserve	3.2	3.3	3.2	3.2	3.3	**16.2**
Total	**-5.4**	**-4.1**	**-5.4**	**-5.1**	**-3.7**	**-23.7**
Normalised Opex						
Work Management	21.3	21.8	19.7	19.8	19.7	**102.4**
Emergency	7.8	7.8	7.9	8.2	8.4	**40.1**
Repairs	10.4	10.7	10.8	11.0	11.2	**54.1**
Maintenance	11.0	11.1	11.2	11.5	11.7	**56.5**
Other Direct Activities	2.0	2.2	2.2	2.2	2.2	**10.7**
Shrinkage	10.9	11.2	11.6	11.9	12.1	**57.7**
xoserve	3.2	3.3	3.2	3.2	3.3	**16.2**
Total	**66.6**	**67.9**	**66.6**	**67.9**	**68.6**	**337.6**
Adjustments						
Work Management	-0.9	-2.3	-1.3	-2.1	-2.9	**-9.4**
Emergency	0.6	0.2	-0.3	-1.0	-1.6	**-2.0**
Repairs	-0.9	-1.4	-1.7	-2.1	-2.4	**-8.6**
Maintenance	1.7	1.1	0.6	-0.2	-1.0	**2.1**
Other Direct Activities	-0.4	-0.6	-0.6	-0.7	-0.7	**-3.1**
Shrinkage	0.0	0.0	0.0	0.0	0.0	**0.0**
xoserve	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**0.0**	**-3.0**	**-3.3**	**-6.2**	**-8.6**	**-21.0**
Proposed Opex						
Work Management	20.4	19.4	18.5	17.7	16.9	**93.0**
Emergency	8.4	8.0	7.6	7.2	6.8	**38.0**
Repairs	9.5	9.3	9.1	8.9	8.7	**45.5**
Maintenance	12.7	12.2	11.7	11.3	10.8	**58.6**
Other Direct Activities	1.6	1.6	1.5	1.5	1.5	**7.6**
Shrinkage	10.9	11.2	11.6	11.9	12.1	**57.7**
xoserve	3.2	3.3	3.2	3.2	3.3	**16.2**
Total	**66.7**	**64.9**	**63.2**	**61.7**	**60.0**	**316.6**

Table 1-1

2 INTRODUCTION

2.1 PRICE CONTROL REVIEW TIMETABLE

The final proposals for the one-year price control have been accepted by the GDNs. Ofgem is now carrying out a further review to set price control allowances for 1st April 2008 to 31st March 2013. The full process is shown in the following diagram.

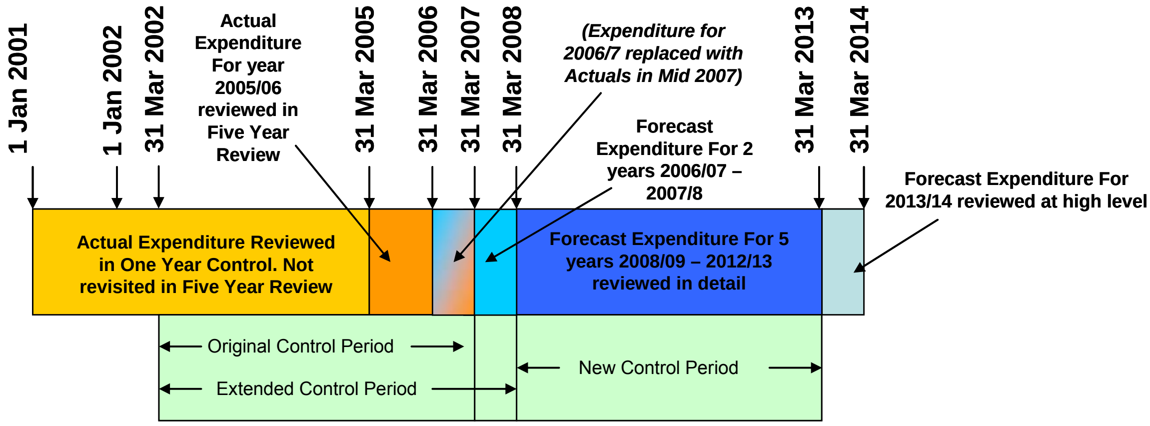

Figure 2-1

2.2 FIVE YEAR CONTROL

Ofgem appointed PB Power working in partnership with Rune Associates Limited to assist them in the preparation of the Capex and Repex elements of the Business Plan Questionnaires (BPQs). Subsequently Ofgem extended this work to include the analysis of the Capex, Repex and Direct Opex submissions by the GDNs.

Our findings on the direct Opex submissions are contained in this report, whilst the Capex and Repex findings are the subject of a separate report.

The questionnaires were issued on 30 June 2006. These were returned to Ofgem between 6 and 13 October 2006. Additionally a series of cost visits were held with the GDNs between 10 November and 1 December 2006. Our findings have been drawn from the BPQs, costs visits and responses to supplementary questions sent to the GDNs.

2.3 BUSINESS PLAN QUESTIONNAIRE

A combined BPQ was issued on 30 June. This covered the Financial Statements, Opex, Capex and Repex requests

GDNs were asked to respond to Ofgem by 6 October 2006 and to upload all the data onto PB Power's file management system, PBShare. All parties in the process were granted appropriate access to relevant folders and documents. Some documents had to be provided in paper copy and these were sent both to PB Power and to Ofgem.

As the analysis of the submissions progressed and where the return was either unclear or insufficient it became necessary to ask the GDNs for additional information. These supplementary questions requests and the additional information, which was presented in reply, were logged and stored on PBShare.

At the end of the process the worksheets were updated to include all amendments submitted and should be read in conjunction with this report.

2.4 PURPOSE

The purpose of the report is for PB Power to provide recommendations to Ofgem on the efficient levels of expenditure required by NGN to carry out their activities in Northern.

Ofgem will consider these recommendations together with other information in proposing appropriate expenditure allowances for 2008/09 to 2012/13.

2.5 ANALYSIS AND REPORTING PROCESS

The BPQ was designed to collect all the data required for analysis.

PB Power has structured this report into the following workstrands:

i) Work Management

ii) Emergency service

iii) Repairs

iv) Maintenance: covering LTS, Storage and Maintenance Other

v) Other Direct

vi) Shrinkage

vii) xoserve

The expenditure projections for the efficient level of expenditure required by the GDN have been reviewed in a number of different ways depending on the activity and quality of information available. Principally two main techniques have been used; a comparative benchmarking between GDNs where workload is sufficiently well defined to obtain reliable regression analysis, and a bespoke review by our consultants to form a judgement on the appropriate expenditure projections based on the information provided. With both methods full analysis of the information presented in the context of the requirements of a Gas Distribution business has been carried out to support the findings.

2.5.1 COST NORMALISATION

A key requirement for robust analysis is that GDN costs for particular Opex activities should be allocated on a consistent basis. Following detailed analysis of the BPQ returns, a number of adjustments have been made to achieve this objective.

These adjustments include applying the results of the work on accounting adjustments carried out by Ofgem, adjustments that have been identified by LECG in their work on indirect Opex, costs which have been removed for the comparative analysis to be carried out and also movement of costs between activities to ensure that costs for each activity are on a consistent basis across all GDNs. This latter set of adjustments includes items identified by NGN in response to our supplementary questions on the allocation of sub-activity costs.

The process restates the GDNs' BPQ submissions on this "normalised" basis. In each section any adjustments to achieve this are specified including the reasoning behind the adjustments.

The adjustments have been classified into the following areas

- **Transfer of costs** – transfers identified by PB Power or LECG which bring allocation of costs into a comparable position for all GDNs.
- **GDN reallocation** – the outcome of reallocation process in which NGN identified the changes to their BPQ submission to reflect our proposed allocation of sub-activities.
- **Accounting adjustments** – which have been provided by Ofgem
- **Pensions adjustments** – GDNs included different assumptions regarding the amounts required to cover the costs of the employer's normal level of contributions to their employees' pension schemes. At Ofgem's request and to bring the direct Opex on to a consistent basis across all GDNs, we have removed the GDN reported pension contributions and replaced them with an amount equal to 22% of direct employee salary/wage costs. The figure reported under this category is the net change between the reported pension costs and the standard assumption.
- **Removed costs** – these costs are one off or special costs which are removed prior to the comparative analysis.

2.5.2 COST ASSESSMENT PROCESS

The expenditure projections for the efficient level of expenditure required by the GDN have been carried out in a number of different ways depending on the activity and quality of information available for this review.

Principally two main techniques have been used:

- comparative benchmarking between GDNs where workload is sufficiently well defined to obtain reliable regression analysis, and
- a bespoke review by our consultants to form a judgement on the appropriate expenditure projections based on the information provided.

With both methods full analysis of the information presented in the context of the requirements of a Gas Distribution business has been carried out to support the findings.

The process of developing our expenditure proposals has the following steps:

- Cost normalisation,
- Establishing base year for cost analysis,
- Benchmarking costs derived from the base year costs,
- Workload projections for the period 2005/06 to 2012/13,
- Cost projections,
- Gap adjustment.

2.5.3 ESTABLISH BASE YEAR

A base year was chosen in order to carry out the comparative regression analysis. The preferred year was 2005/06, where the availability of actual outturn values removed any element of variation due to GDN forecast values. However, for some activities the year 2006/07 has been used due to variations in the 2005/06 data. Generally it has been found that the year 2004/05 contains too many inconsistencies in data reporting, mainly due to the network sales process, and is not suitable as a base year for comparative analysis.

2.5.4 BENCHMARK COST ANALYSIS PROCESS

We have determined benchmark costs in the manner most appropriate to the data and the activity.

Some costs were best assessed on an individual basis. For example, [redacted] pipeline costs are contract specific.

These costs were removed before determination of the benchmark costs of an activity, and were assessed separately. If appropriate an allowance for such costs were added back after the assessment of the costs for the activities which are common across GDNs.

Where possible we used comparative analysis to determine benchmark activity costs. In general we have used the following type of cost function which is common in the regulatory literature:

$$\text{Cost} = K\ w^{a} \qquad (1)$$

where K and a are constants.

Where there are economies of scale associated with an activity, a<1, so that the unit cost of an activity for a larger network will be less than for a smaller network. For each activity we have used our knowledge and experience to explore different cost drivers and select the most appropriate workload driver (w) for the activity concerned.

By taking the natural log of equation (1) we can derive the following equation:

$$\ln(\text{Cost}) = \ln(K) + a \ln(w) \qquad (2)$$

This equation is used to carry out the regression analysis and estimate each of the parameters of the cost function.

Some costs may be better modelled with a cost function of the form

$$\text{Cost} = C + A\ w \qquad (3)$$

where C and A are constants.

For each activity we have assessed which form of equation (1) or (2) better explains the variation in costs.

To obtain the frontier costs it is usual to reduce the constant K in equation (1) or the constant C in equation (2), so that the regression line passes through the observation with the lowest error term. This gives the Corrected OLS (COLS) line. We have applied an alternative approach which recognises that differences between the GDNs' regression line and their actual costs may reflect other factors than just efficiency. This involves adjusting the regression line so that it passes through the upper quartile error level. This gives us the upper quartile line.

However, the effect of reducing C in equation (3) by an amount Δ is to reduce unit costs at each workload w by Δ/w. This means that the impact on unit costs is different at different workload levels and smaller networks will be required to reduce unit costs by more than larger networks both in absolute and proportional terms.

On the other hand, the effect of reducing K by an amount Δ in equation (1) is to reduce all costs at all workloads by the same proportion $(K-\Delta)/K$.

We have therefore used a different method for setting the benchmark performance when using the linear regression which aligns more closely with the method used with equation (1).

We have defined the benchmark performance in the linear model not by reducing C but by reducing the slope A in equation (3). Assuming that the intercept C is fixed, the error term reflects differences in unit (variable) costs. The benchmark is determined by the upper quartile unit cost.

The effect of this is to reduce the unit costs of all networks by the constant amount δ where δ is the difference between the regression slope and the benchmark slope.

Since the change in each GDN unit costs is independent of workload, smaller networks will be required to make smaller percentage changes in unit costs than larger networks. Effectively, we are assuming that the changes required to give benchmark performance have an economy of scale attached to them.

Assessment of regression outcome

When we have carried out regression analysis we have assessed the fit of the regression line to the data points by calculating the r^2 value and by carrying out hypothesis testing where the r^2 values are not directly comparable.

The value of r^2 is one indicator of goodness of fit. It is the proportion of the variance in the cost data that is explained by the variance in the cost data derived from the OLS regression.

We have used appropriate tests to determine whether the linear or the logarithmic linear regression gives the better fit to the data and have used the regression with the better fit. Where there is no significant difference in fit the logarithmic linear regression has been used.

For all the regression relationships used in this report $r^2>0.7$. Unit cost and/or bottom-up analysis has been used in all other cases.

These values of r^2 have the following significance:

- It is possible that the data points could show a relationship between the reported costs and the explanatory variable by chance. Analysis of variance identifies the component of the cost variable which is explained by the regression and the component unexplained by the regression. This gives a value for the F statistic and taking into account the number of data points, this can be used to test whether the explanation provided by the regression is better than is likely to have arisen by chance. With 8 (GDN) data points the test value for the F statistic is 5.99 and the corresponding value for r^2 is 0.5. If $r^2>0.5$ we can reject the hypothesis that the relationship arose by chance at the 5% significance level. If $r^2>0.7$ we can further reject the hypothesis at the 1% significance level

In order to test for the robustness of the regression results and in particular of the slope of the regression line, we have tested each regression result for heteroscedasticity (that is for a relationship between the variance in the disturbance term and the magnitude of the explanatory variable). This is important since evidence of heteroscedasticity could indicate a mis-specification in the regression model. The regression results presented in this report do not show such evidence at a significant level

Although we have carried out detailed work to seek to ensure that the costs used in the regression analysis have been allocated to activities on a consistent basis across all GDNs, we recognise that that some different allocations may remain and that the use of regression to determine benchmark costs could potentially lead to an inadequate level of total Opex for a particular GDN. We have addressed this possibility by selecting the upper quartile value, rather than the lowest value as the benchmark cost, with any remaining effects mitigated by the gap closure process.

Two or more workload drivers

In some cases activity costs are driven by a number of different workload types. In such cases we have constructed a composite scale variable (CSV) which includes the different drivers scaled by the proportion of costs attributable to each type of workload.

Linear regression has been used to determine the relationship between costs and the CSV.

Unit cost analysis

Here we have ranked the unit costs and selected the upper quartile unit cost as the frontier unit cost. Where there is a wide variation in unit costs we have selected the average unit cost as the benchmark.

Bottom-up analysis

Using consultant's knowledge, judgement and analysis of similar activities, we have developed costs for a typical task representing the workload driver, or for a range of such tasks. The results have been used to confirm or adjust the benchmark costs obtained by regression or unit cost analysis and in some cases it has been the main method where regression gave poor fit or there were large variations in reported costs. The specific techniques used to determine the benchmark costs for each Opex activity are set out in the text for that activity.

Regression Values

Further details of the regression calculations and numbers are given in Appendix 7.

2.5.5 WORKLOAD PROJECTONS

The above approach has allowed the analysis to fully reflect the workload forecast by the GDNs, adjusted as deemed appropriate by our consultants. It has also minimised any inconsistent allocation of costs between activities, which is suspected in a number of areas.

The PB Power workload projections for the activity are determined for the period 2005/06 to 2012/13 from the activity analysis.

2.5.6 COST PROJECTIONS

This benchmark performance applied to our workload projections has then been used as the target which all under performing GDNs should move towards.

The following shows the performance measures used in assessing the Opex proposals.

Performance Measures Used in Determining The Opex Proposals	
Benchmark Performance	The Upper Quartile performance as determined from the regression analysis tracked forward from the base year to 2012/13 taking account of PB Power's expected productivity improvements. When showing this trend in the charts, along side our proposals, it is also adjusted for PB Power's assumptions for real price effects.
Baseline Performance	The GDNs BPQ reported performance in the base year tracked forward to 2012/13 taking account of PB Power's expected productivity improvements. When showing this trend in the charts, along side our proposals, it is also adjusted for PB Power's assumptions for real price effects.

Table 2-1

The benchmark costs against workload are shown in pink on the graphs. This is the target which all under performing GDNs should move towards

In the logarithmic linear regressions the pink line is parallel to the regression line.

In the linear regressions, the pink line has the same intercept as the regression line but with a slope equal to the upper quartile unit cost.

In our approach annual productivity improvements are applied to total costs. This gives the end (2012/13) target cost line, shown in yellow on the graphs. This represents the expected position of the benchmark 2012/13 costs after allowing for the productivity improvements we expect to apply to a frontier efficient company.

2.5.7 GAP ADJUSTMENT

In order to form a view of the speed at which the GDNs should be expected to move towards this target performance, extrapolation of the base year performance has also been carried out for the whole period using our standard assumptions for any price rises which are expected to be in excess of the Retail Prices Index (RPI). Section 2.7 provides more details on real price effects.

A gap adjustment has been included where appropriate to provide a smooth transition from the BPQ level of costs at the PB Power workload levels to the benchmark performance by 2012/13. The gap adjustment will allow the GDN a period to review and amend their work arrangements to achieve the proposed benchmark efficient cost levels.

2.5.8 SUMMARY CHART

The overall process for deriving our recommended expenditure projections is shown in the flow chart below.

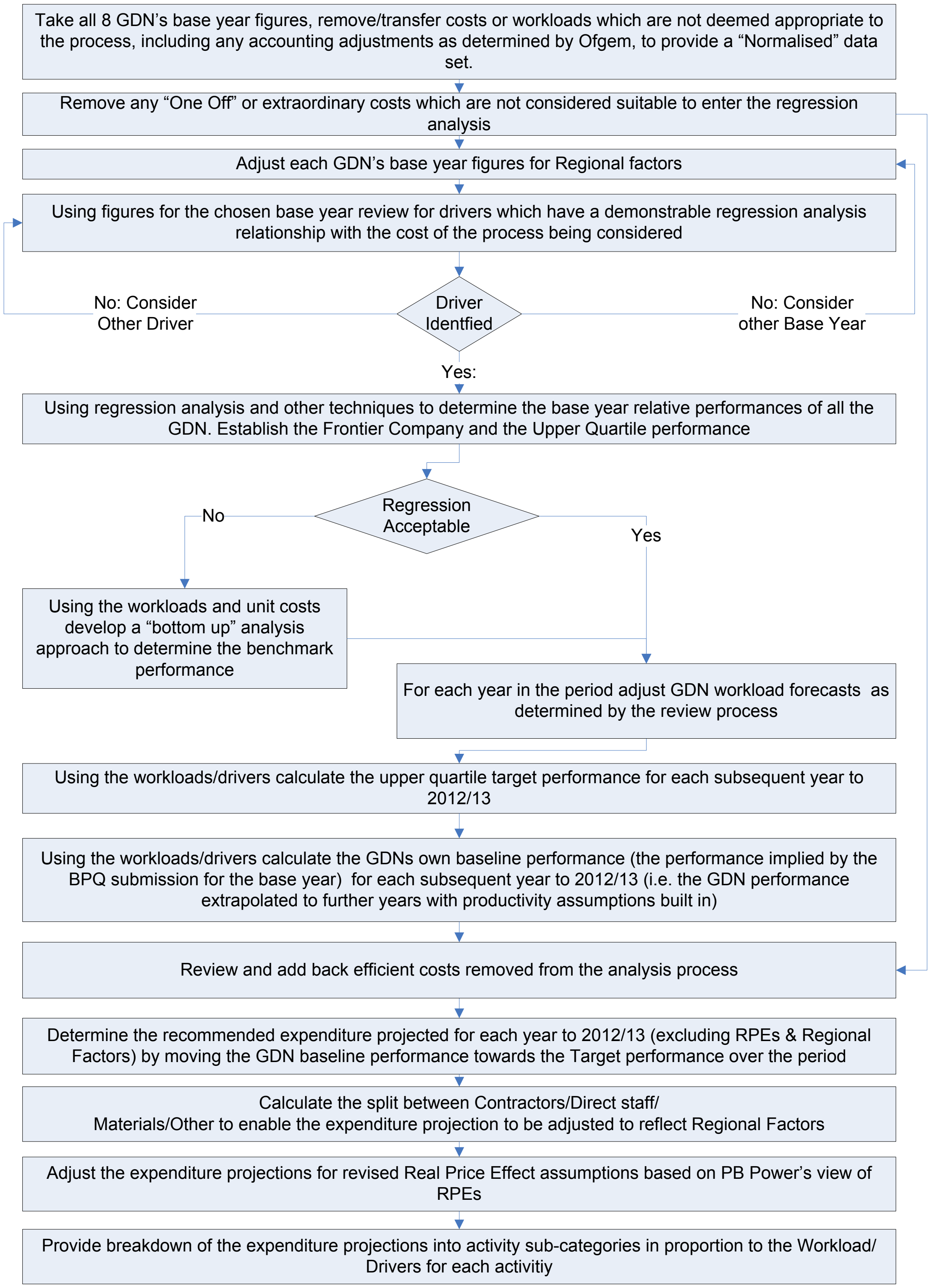
Take all 8 GDN's base year figures, remove/transfer costs or workloads which are not deemed appropriate to the process, including any accounting adjustments as determined by Ofgem, to provide a "Normalised" data set.
Remove any "One Off" or extraordinary costs which are not considered suitable to enter the regression analysis
Adjust each GDN's base year figures for Regional factors
Using figures for the chosen base year review for drivers which have a demonstrable regression analysis relationship with the cost of the process being considered
No: Consider Other Driver
Driver Identfied
No: Consider other Base Year
Yes:
Using regression analysis and other techniques to determine the base year relative performances of all the GDN. Establish the Frontier Company and the Upper Quartile performance
No
Regression Acceptable
Yes
Using the workloads and unit costs develop a "bottom up" analysis approach to determine the benchmark performance
For each year in the period adjust GDN workload forecasts as determined by the review process
Using the workloads/drivers calculate the upper quartile target performance for each subsequent year to 2012/13
Using the workloads/drivers calculate the GDNs own baseline performance (the performance implied by the BPQ submission for the base year) for each subsequent year to 2012/13 (i.e. the GDN performance extrapolated to further years with productivity assumptions built in)
Review and add back efficient costs removed from the analysis process
Determine the recommended expenditure projected for each year to 2012/13 (excluding RPEs & Regional Factors) by moving the GDN baseline performance towards the Target performance over the period
Calculate the split between Contractors/Direct staff/ Materials/Other to enable the expenditure projection to be adjusted to reflect Regional Factors
Adjust the expenditure projections for revised Real Price Effect assumptions based on PB Power's view of RPEs
Provide breakdown of the expenditure projections into activity sub-categories in proportion to the Workload/ Drivers for each activitiy

Figure 2-2

2.6 COSTS

All costs in the report are in 2005/06 prices unless otherwise stated.

The table below shows the factors which have been used to convert pre 2005/06 costs to 2005/06. These factors have been used throughout the analysis.

Convert to		Convert from						
		2000	2001	Q1 2002	2002/03	2003/04	2004/05	2005/06
	Index	170.25	173.35	173.87	177.52	182.48	188.15	193.11
	2000	1.00	0.98	0.98	0.96	0.93	0.90	0.88
	2001	1.02	1.00	1.00	0.98	0.95	0.92	0.90
	Q1 2002	1.02	1.00	1.00	0.98	0.95	0.92	0.90
	2002/03	1.04	1.02	1.02	1.00	0.97	0.94	0.92
	2003/04	1.07	1.05	1.05	1.03	1.00	0.97	0.94
	2004/05	1.11	1.09	1.08	1.06	1.03	1.00	0.97
	2005/06	1.13	1.11	1.11	1.09	1.06	1.03	1.00

Table 2-2

2.7 REAL PRICE EFFECTS

The submissions have been made on the basis of 2005/06 prices and RPEs have also been identified, Appendix 7 gives details of the rates we have assumed have been used by NGN in the compilation of their BPQ submission. In addition to the increases from the Retail Prices Index (RPI) assumed at an annual rate of 2.5%, other costs have been assessed as potentially rising faster than this rate. These additional increases used in this report have been summarised in Table 2-3 and are discussed further in the sections below.

We have made adjustments to the submissions for all areas of the BPQ excluding Non-Operational Capex as we consider most of this expenditure is project based which will have been made on the basis of the best available planned processes at the time of the submissions. We consider it more appropriate to consider adjustments to this type of expenditure on a case by case basis.

Real Price Effects		2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Contractor Rates Year on Year	2.25%	100.0	102.3	104.6	106.9	109.3	111.8	114.3	116.9
Materials year on Year	1.00%	100.0	101.0	102.0	103.0	104.1	105.1	106.2	107.2
Direct Labour	1.00%	100.0	101.0	102.0	103.0	104.1	105.1	106.2	107.2

Table 2-3

2.7.1 CONTRACTOR PRICES

Contractor prices have a major impact on the costs of the GDN operations particularly in the areas of connections, mains replacement works and LTS projects. All GDNs have forecast that contractor prices will increase at a greater rate than the RPI. They have quoted particularly the Price Adjustment Formulae for Construction Contracts Indices published by the DTI (commonly known as the Baxter Indices) as evidence of the historical rate of real price inflation for these contracts. These trends have been set out in Figure 2-3 below.

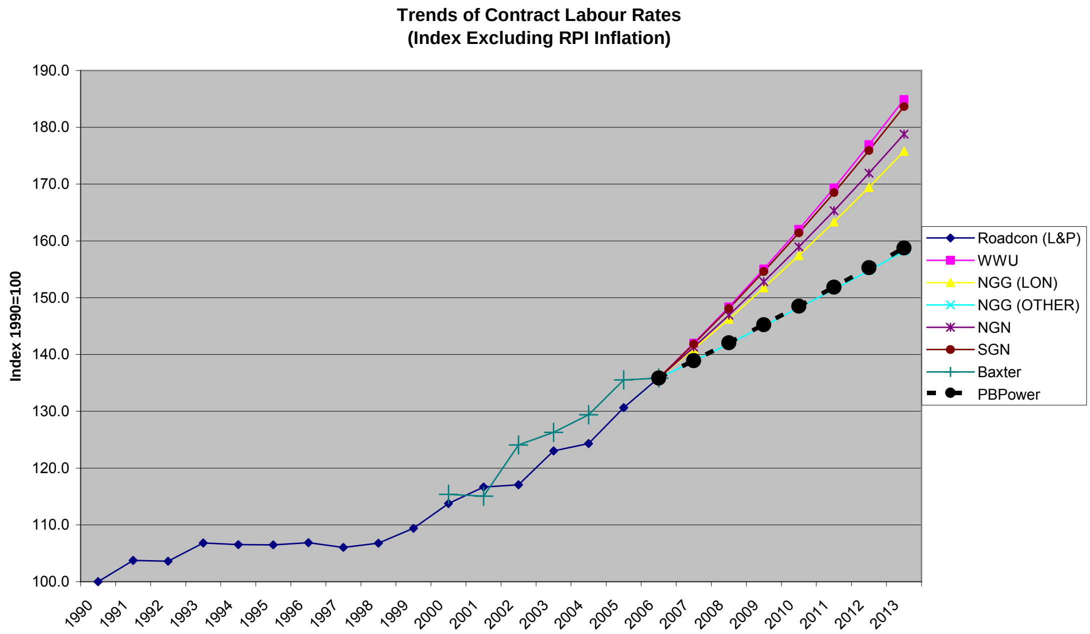

Figure 2-3

We have investigated these trends looking for comparisons for the gas distribution costs. These indices do not uniformly increase month by month as there tends to be step changes each year as contracts are re-negotiated. Examination of the most recent trends suggests that the high increases experienced a year ago have flattened out.

We have also compared the data with the Public Sector Construction Works Indices (Road Construction) published by the DTI. Whilst this sector is not directly reflective of gas distribution activities it is useful as a comparator to the Baxter Indices. As can be seen from Figure 2-3, whilst the two indices show small differences year on year the trends demonstrate a very similar increase.

Having considered all of the previous trend information we have concluded that a projection of 2¼% is appropriate which is also shown in Figure 2-3.

Our analysis assumes a single rate of Contractor price increases across all GDNs with no differences between regions of the UK for the rate of increase.

2.7.2 DIRECT LABOUR COSTS

All GDNs have submitted the view that direct labour costs will continue to increase at a greater rate than the RPI.

Forecasting future wage and salary trends in relation to inflation is a matter of speculating on the outcome of future negotiations and many complex factors. Government's concern is with the control of inflation and as such encourages settlements at or below inflation.

The best evidence for future trends comes from recent experience. The DTI Employment Relations Research Series document No 56 dated March 2006 indicates that in the past decade, UK employees have enjoyed strong real (inflation adjusted) wages growth of 2¾ per cent a year in the private sector. Public sector employees saw a slightly lower annual growth rate of around 2¼ to 2½ per cent in real earnings. This period spanned the introduction of the minimum wage and it appears that more recent real growth has slowed. The most recent Annual Survey of Hours and Earnings (ASHE) in April 2006 indicated that median gross weekly earnings were 4.1% in 2005. During this period inflation averaged 3%. Continuing this trend, the Ernst & Young ITEM Club indicated recently that average earnings increased by 4.1% in the year to November, despite a tightening labour market.

Based on recent evidence, a real price effect forecast of 1% for direct staff costs has been used in our analysis.

2.7.3 MATERIAL COSTS

All GDNs have submitted the view that material costs will continue to increase at a greater rate than the RPI. Having reviewed these rates we believe a reasonable rate of increase above RPI will be 1%. We conclude that this figure should be taken together with the productivity savings assumed which balance the effect of these increases.

2.7.4 OTHER COSTS

No specific evidence has been provided on real price rises for other costs and therefore our analysis has assumed no increases above RPI.

2.8 REGIONAL FACTORS

2.8.1 CONTRACTOR PRICES

We have based our initial views on the Quarterly Review of Building Prices as published by the Building Construction Information Service (BCIS) of the Royal Institution of Chartered Surveyors (RICS). This document provides a complete regional index of construction costs for the UK. For the purposes of our analysis we have rebased the October 2006 indices with Northern Ireland, Jersey and the Scottish Highlands excluded. We have estimated the percentage for each county falling into each GDN, thus being able to derive an index of construction costs for each GDN. The table below sets out the values used for the analysis, the same factors have been used for each year. Details of the assumptions used to determine these factors are given in Appendix 5.

Regional Factors	WW	No	Sc	So	EoE	Lon	NW	WM
Regional Factors (Contractor Prices)	0.96	1.01	0.99	1.06	1.00	1.11	0.93	0.94

Table 2-4

2.8.2 DIRECT LABOUR COSTS

The Annual Survey of Hours and Earnings (ASHE) published by the DTI shows that there is a substantial London effect on average earnings. This shows that London wages are on average 30% higher than the national average.

Using this figure for London only, an assessment has been made as to how this impacts the GDNs. We concluded that only Southern and London GDNs are affected and that they are not fully exposed to the 30% uplift as the whole of the GDN is not within London and many activities are carried out away from the London location.

Our conclusions are set out in Table 2-5.

Regional Factors	WW	No	Sc	So	EoE	Lon	NW	WM
Regional Factors (Direct Labour)	0.98	0.98	0.98	1.03	0.98	1.10	0.98	0.98

Table 2-5

2.8.3 MATERIAL COSTS

No specific evidence has been provided of a regional impact on material prices and therefore our analysis has not used any regional factors for material costs.

2.8.4 OTHER COSTS

No specific evidence has been provided by NGN of a regional impact on other prices and therefore our analysis has not used any regional factors for other costs.

2.9 PRODUCTIVITY

Although we have not undertaken a full study of past productivity we have examined published information to determine an assumed base annual increase in productivity. We understand other consultants are undertaking broader economic studies of the operation of the GDN businesses.

Looking at the productivity information published by National Statistics on output per worker the average annual increase over the last 10-40 years is in the range 1.7% - 2.0%. In addition a report on the OFWAT web site compiled by Stone & Webster Consultants Limited in 2004 concluded "Broadly, the average rate of Opex productivity growth for [Water and Sewage Companies] has been in the range 1.7-1.9% per annum over the [period 1992-93 to 2002/03]". In the light of these figures we have made a conservative assumption of 1% base annual increase. We have then used our engineering experience and judgement when reviewing the business plans of the companies to determine where we believe there is scope for additional productivity above this base rate.

The table below lists the areas in which our analysis has used an assumption for productivity to automatically generate our proposals over the period. The table also shows where we believe there is scope for productivity improvements, higher scope being identified by more ticks.

In other areas of analysis we have used the GDN's own forecasts modified as appropriate for specific issues.

Activities	Rate	Potential Opportunities (Above base Productivity)					
		New Techniques	Labour Productivity	Clerical Support Costs	Process Improvements	Contractual Reductions	IS Improvements
Opex – Work Management	1%						√√√
Opex – Remaining	1%						
Capex - Connections	3%	√	√√	√√√	√√√	√√	√√
Capex – Mains Reinforcement	2%	√√	√	√	√	√√√	√
Repex - All	1.75%	√	√	√	√	√√	√

Table 2-6

Our productivity assumptions are extrapolated to subsequent years based on the regression carried out on the information provided in the regression base year. We recommend that following the update of 2006/07 outturn figures, our assumptions are reviewed in the light of potential performance improvements already achieved during the 2006/07 financial year.

2.10 OUTER MET AREA

A geographical area on the boundary of the East of England Network and the London Network, the Outer Met Area, is for regulatory and income accounting purposes part of the East of England Network. However, the area is managed by NGG as part of the London Network. In the review of Direct Opex all comparative analysis has been carried out on the basis that the costs and work for the Outer Met Area have been included within the London figures. The BPQ has been completed by NGG on this basis with the exception of low pressure gas holders. We have therefore modified these returns for London and East of England Networks to ensure the analysis has been carried out on a consistent basis. The operating costs, assets and liabilities are deemed to be 9% of the transportation business operating costs, assets and liabilities of the London Network. We recommend that future returns and analysis is carried out on the basis that all aspects of the Outer Met Area is reported and analysed as being part of East of England Network.

2.11 PENSION ADJUSTMENTS

GDNs have included different assumptions regarding the amounts required to cover the costs of the employer's normal level of contributions to their employees' pension schemes. To bring the direct Opex on to a consistent basis across all GDNs, we have removed the GDN reported pension contributions and replaced them with an amount equal to 22% of direct employee salary/wage costs as advised by Ofgem

3 WORK MANAGEMENT

3.1 SUMMARY

Controllable Opex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission	23.0	23.9	21.4	21.6	21.5	**111.4**
Normalisation Adjustments	-1.7	-2.1	-1.7	-1.8	-1.8	**-9.0**
Normalised BPQ	21.3	21.8	19.7	19.8	19.7	**102.4**
Adjustments	-0.9	-2.3	-1.3	-2.1	-2.9	**-9.4**
Proposed	**20.4**	**19.4**	**18.5**	**17.7**	**16.9**	**93.0**

Table 3-1

3.2 POLICIES & PROCEDURES

3.2.1 INTRODUCTION

NGN Northern Network has a clear route of governance by which policies and procedures are formed, approved, and implemented. They have a Policy Framework Review Panel which identifies the need for new or reviewed documents brought about by legislation, regulations or internal Company requirements. Appendix 1 reviews the Financial and Technical framework under which Northern operates, the structure they utilise to manage their assets effectively and the key policies they adopt to ensure they meet their statutory and licence obligations and other regulatory requirements.

This section reviews the various statements made by Northern in support of their work management planning processes and expenditure forecasts.

3.2.2 SCOPE OF POLICES AND PROCEDURES

The Work Management activity has to carry out its functions in such a way that the pipe laying and relaying, emergency, repair and maintenance activities are able to comply with their key policies and procedures.

This includes meeting the standards of performance under the Gas Act in relation to handling of calls to the emergency call centre and the repairs of escapes in accordance with the timescales set out in the Gas Safety (Management) Regulations (GS(M)R).

Policies and procedures, which apply specifically to Work Management, include those that are established to govern the capture and retention of essential information about assets, when they are added to or removed from the network asset inventory, or when they are maintained. Key Policies for this are:

T/PL/RE/1: Policy for Capture, Update and Retention of Engineering Asset Records.

T/PL/DR/1: Policy for the Capture of Pipe Asset Records

3.2.3 REVIEW AND UPDATE PROCESS

The Network has a Policy Framework Review Panel, which is formed to consider changes to the Policies and Procedures, prompted by changes in external Legislation, other external drivers such as Ofgem requirements, changes/updates in IGEM documents, or identified internal Network requirements.

The Panel may consist of Northern personnel, Service Provider personnel and External Specialists and/or Consultants. The Panel will manage the production of draft documents, to be reviewed by a peer group, before being submitted to the Gas Network Special Engineering Committee (GNSEC), for approval and/or implementation. Governance responsibility for all documents is held by Northern Gas Networks.

When new documents are approved, briefings and/or detailed training is given to those affected.

3.2.4 EFFICIENCY AND PRODUCTIVITY

We have not carried out detailed audits of the degree of compliance within the Network to the stated policies and procedures. However, within the category of Work and Asset Management, we can say that, from the evidence offered within the BPQ responses, responses during our visit, and replies to supplementary questions, there are no indications that they are not being followed. There is no evidence of systematic failures of equipment processes or systems, which could indicate inadequate policies or procedures, or lack of compliance. Similarly, within safety related statistics, such as lost time accidents, there is no evidence of unsafe practices being employed, which could be used as an indicator of the lack of compliance with documented Policies and Procedures.

Northern have implemented a business model, which out sources work delivery to an independent Service Provider, whilst retaining Asset Management and Maintenance strategic policies and workload setting, within Northern. Early indications, during the first two years, are that the model is providing a robust mechanism for controlling Opex performance overall, We recommend that the current approach is viewed as efficient, and viewed as satisfactory to use as a basis for forecast projections.

For Work Management, new `front office` systems have been implemented with associated new management information systems, these enable detailed information to be fed back to personnel at all levels. In particular these systems are relieving Supervisors of some elements of their past administrative roles, enabling greater attendance by them on site, and the input of their knowledge and experience in ensuring jobs are approached and undertaken in the most efficient and effective way possible.

We recommend that the current approach to policies and procedures is viewed as effective, and viewed as a satisfactory basis for compiling expenditure forecasts.

3.3 HISTORICAL PERFORMANCE

3.3.1 INTRODUCTION

We would expect the historical performance of Work Management to be represented by the combination of historical Management Information drawn from Job Statistics and costs for this category of work. This historical performance could be helpful in developing trends of workload, costs, and unit costs, which could be then used to make comparisons year on year, and also to make comparisons of Northern s and other GDNs' performance.

Work Management encompasses a range of work activities from Call Centre operation to Supervision on site, from Safety and Environment management to Records Management. Historical management information for these and other Work Management activities, pre 2005/06 is of limited value in making comparisons, because in the preceding years National Grid undertook a number of organizational restructures, moving some support sections between Networks (LDZs), Network Clusters (lead networks), and Central Support functions. During these periods of considerable organisational change, changes also occurred in the way such support costs were allocated across Networks and activities. Inter year, and inter Network comparisons of costs cannot be substantiated for this period.

We have therefore used the cost data only for the years 2005/06 and 2006/07 for benchmarking and to understand the costs. We believe that it represents the best approach based on the available information. We anticipate replacing the forecast Northern 2006/07 figures with `actuals` before the end of this Review process.

The factors influencing historical costs will be the following:

Staff costs

Work management is a labour intensive activity, with approximately 85% of costs being staff related. Real increases in salaries and wages have a very significant impact on Work Management costs. Using staff efficiently, having staff with the correct competencies, adequate training, supportive IT systems, and only engaged in the processes that are essential, will minimise waste and minimise the costs of Work Management. Northern has adopted their business model with the intention of setting and agreeing tight target costs with their Service Provider UUOL, and requiring UUOL to get the staff costs and productivity in line with the agreed delivery costs. Northern are now into the second year of operation of this structure, and are very positive that it is yielding benefits in terms of staffing costs..

Technology

Getting the most from staff also requires appropriate tools to complete their tasks, we believe that Northern have rightly chosen to replace the FOMSA front office system at the earliest possible stage. We note that in preparation for that, Northern report that they mapped all the processes that were necessary for the completion of tasks in Work Management, so they believe there is a clear understanding within the Network staff, what is required to be delivered by this activity, and their specific contribution to the delivery. The clear definitions of process content and linkage have been used to ensure that management information from the new systems is tightly focused on key outputs.

3.3.2 DEFINITION OF ACTIVITY

Work management encompasses disparate work activities. The sub activities included in this assessment are:

Staff and other non-operational costs, including activities associated with:

a) Asset Management
   - network integrity
   - planning and design.

b) Supervisory costs
   - Field supervision

c) Project Support
   - NRSWA management
   - Work scheduling, dispatch and closure
     - Emergency
     - Repairs
     - Maintenance
     - Capex
     - Repex

d) Contract Management

- managing the relationship with engineering contractors
- managing the relationship with other bought in services

e) Customer Management

- Call handling
- managing the processes that interface with consumers
- managing the processes that interface with shippers

f) Network Support, costs associated with engineering back office

- records management
- network analysis
- work and resource planning processes.

g) Health, Safety and Environment.

h) Network Policy

i) Safety & Engineering

Work management includes all costs incurred by Northern under the Network Services Agreements (NSAs) with NGG. These agreements cover:

- Call Handling
- Dispatch
- Digitisation
- Systems Operation (SOMSA)
- Advantica (specialist services)
- Metering managed services
- Transmission services

The dispatch and digitisation NSAs were terminated by Northern in 2006/07, and replaced by in-house systems.

Transmission services were coded by Northern in their BPQ response to LTS maintenance, but under our normalisation of costs these costs have been re-assigned to work management.

NGG currently carry out System Operation on behalf of all GDNs. System Operations for the IDNs will be transferred out of NGG into the IDNs as part of a collaborative project SOMSA Exit, during the next price control period. The impact on Opex is that as the project proceeds, staffing numbers will be reduced in NGG, and there will be a corresponding increase in staffing numbers in the iDNs. For Northern, current plans, and their BPQ forecast include the SOMSA Exit year to be 2009/10, after a period of parallel running to prove their Control to the satisfaction of the HSE.

3.3.3 ESTABLISH UNDERLYING COSTS

Cost normalisation

Section 2.5.1 gives details of the generic normalisation adjustments which have been carried out. For Work Management the principal normalisation adjustments are outlined below.

- **Cost transfer** – there has been one transfer from Work Management, related to the movement of NSA costs from LTS Maintenance.
- **GDN reallocation** – the outcome of reallocation process in which Northern identified the changes to the allocation of costs, to reflect our proposed allocation of sub-activities1.
- **Accounting adjustments** – which have been provided by Ofgem.
- **Pensions adjustments** – these adjustments are the net adjustments between Northern's reported pension costs and the standard pension costs used by PB Power.
- **Removed costs** – these are costs considered unjustified for inclusion. In this case, the staff costs for the parallel running of Systems Control during SOMSA Exit.

The detail of the adjustments to the BPQ costs submitted by Northern, is given in the following table.

Normalisation Adjustments	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Cost transfer	1.1	1.5	1.4	1.4	1.4	1.4	1.4	1.4	11.0
NSA transfer from LTS Maintenance	1.1	1.5	1.4	1.4	1.4	1.4	1.4	1.4	
GDN reallocation	-2.2	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-20.6
Ofgem Accounting Adjustments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pension Adjustments	0.7	-0.3	-0.4	-0.4	-0.4	-0.5	-0.5	-0.5	-2.3
Removed costs	0.0	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	-0.5
SOMSA	0.0	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	
Total	**-0.5**	**-1.4**	**-1.6**	**-1.7**	**-2.1**	**-1.7**	**-1.8**	**-1.8**	**-12.4**

Table 3-2

In this Section all costs are shown on a normalised basis as described above.

2005/06 and 2006/07 costs

The cost trends for work management are only available for the years 2005/06 and 2006/07, and for Northern are shown below, in Table 3-3:

Controllable Work Management Opex by category adjusted for regional factors (£m)	2005/06	2006/07
Contract	2.0	1.8
Direct	11.4	11.0
Materials	0.0	0.0
Other	6.6	7.2
Total	**20.0**	**20.0**

Table 3-3

[1] Full details of the GDN reallocation are given in Appendix 6

The 2 main items, which comprise `other`, are given in the Table 3-4 below:

Line item (£m)	2005/06	2006/07
NSAs	3.9	4.1
Non salary staff costs	2.1	2.5

Table 3-4

For the years 2005/06 and 2006/07 Northern Work Management cost is stable at 14% below the average of all GDNs costs.

Work Management Unit Costs

Section 2 sets out the approach we use to set frontier costs. The following techniques are used:

- Bottom-up analysis.
- Regression analysis
- Unit cost analysis

To use these techniques we need to establish a cost driver or explanatory variable. For Work Management we have done this as part of the bottom-up analysis described below.

Bottom-up cost analysis

We believe that Work Management costs are driven by a combination of drivers, all of which are related in some way to the size or scale of the network operation. Initially our work concentrated on the alternatives of the length of <7bar network, or the energy throughput. We felt that neither of these truly reflected the changes on Work Management workload from the changes in Repair and Emergency Services workloads for which Work Management provides support and supervisory resources.

We have reviewed the number of staff that a typical GDN would require to operate effectively and efficiently. We have estimated the minimum number of Work Management Staff for the average GDN, commensurate with safe working and sustaining the business. Based on the following table summarising Work Management Activity costs submitted by the GDNs we have assumed that on average staff related costs are 85% of Work management costs:

Work Management Activity Cost Element 2005/06	£m	£m	%
Staff costs including Agency Staff	99		
Sub Contractors	16		
Non-Salary Staff Costs	20		
NSA (75% staff related)	17		
		152	82
Total Work Management		**186**	**100**

Table 3-5

Given that other costs within Work Management are people related, such as technical services and consultancy, we believe a figure of 85% is representative.

Based on BPQ information an average GDN has a length of <7 bar pipe network of 33,000km with 20,000repairs per annum and 135,000 PREs per annum. These parameters are taken from rounded averages of all GDN statistics.

We have estimated the minimum number of FTEs required to support this workload. The results of this analysis are set out in Table 3-6.

In assessing these numbers we have assumed increases in efficiency in the area of support staff in the belief that impacts of improved IT systems will have a major effect on back office activities, job/task closure process and record management. We believe that we have established the minimum number of FTEs for a DN operating with a centralised support service, which we believe to be the most efficient operational structure. When compared with 2006/07 staffing levels, this represents a 19% cut in staff.

A cost per FTE has been used to estimate total costs. This has been obtained by dividing the total staff costs for all GDNs, including normal pensions, standby, and overtime, by the number of FTEs employed on Work Management by all GDNs. This results in a cost of £35,000 per FTE.

Work Management sub-activity	FTEs	Cost @£35,000 per FTE £m
Operational Supervision	147	5.1
Network Support	202	7.1
Network Strategy	59	2.1
Commercial	12	0.4
Total	**420**	**14.7**

Table 3-6

Table 3-6 addresses 85% of Work Management costs, and arrives at a cost of £14.7m. The remaining 15% of total Work Management costs is for non-staff related costs. Based on our calculations from Table 3-6 above this amount is £2.6m. Our bottom-up estimate of the efficient Work Management costs for an average GDN is therefore, £17.3m per annum.

To refine this analysis, we have reviewed the percentage of Work Management resources which are used to support the Repair activity, the Emergency Service, and all other Opex activities. Few parts of Work Management exclusively support one activity, Emergency call handling, however, being an exception. We have made a judgement on the proportion of work management costs associated with each of the activities as set out in Table 3-7 below

The table also shows the proposed driver of costs in each case.

Activity Serviced by Work Management	Driver	Work Management allocation of costs to activity %
Emergency Response	Number of PREs	30
Emergency Repairs	Number of repairs	30
Other Operational Activities	Length of <7bar Pipe (Kms)	40

Table 3-7

We have therefore developed a composite cost driver based on the proportion of costs driven by each activity shown in the above table.

The composite cost driver CSV = Average length of mains x

(0.3 x No. of PREs / Average no. of PREs

+ 0.3 x No. of repairs / Average no. of repairs

+ 0.4 x length of < 7bar main / Average length of mains)

The component variables of the CSV are each scaled by their respective average GDN values so that the balance between the components of the CSV is independent of the choice of units used to quantify each component variable.

The unit cost for the average of all GDNs is £17.3m divided by 33000 (the CSV for the average network), or £524/CSV.

Regression analysis

This CSV driver is used in a regression analysis to establish a relationship between costs and volume of Work Management activities.

As discussed in Section 2, the starting point for setting the target benchmark is an Ordinary Least Squares (OLS) regression on the eight data points, one for each GDN, applicable in the base year (2005/06). The regression calculation determines a relationship between the costs and the workload driver. The regression line is shown in black on the graphs.

As discussed in Section 2 we have then adjusted the regression line to give the upper quartile regression line which is the target which all under performing GDNs should move towards. This is shown in pink on the charts.

High performing networks will be expected to continue to improve their performance over the period to 2012/13. The resulting target costs for 2012/13 are shown in yellow on the charts.

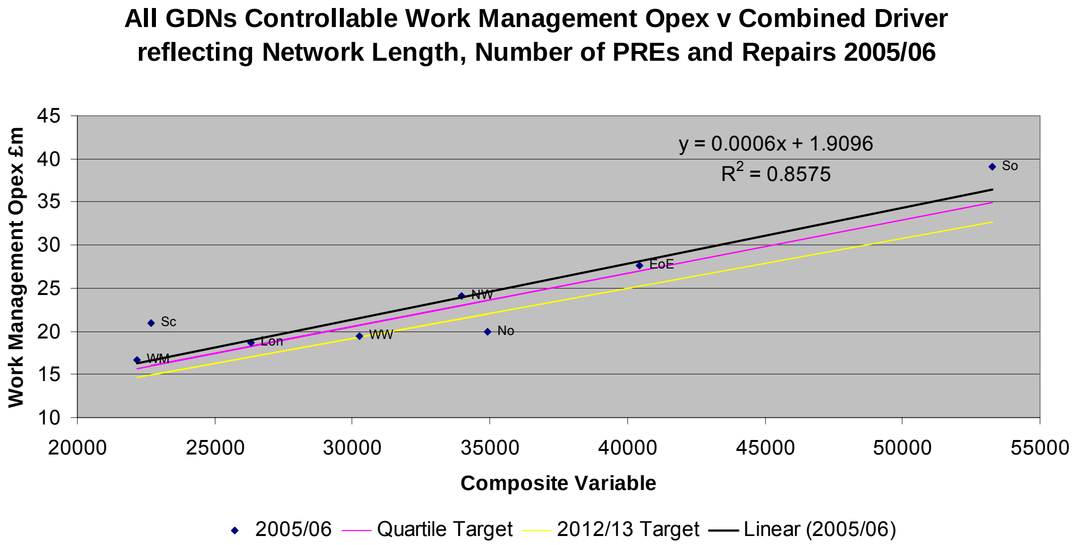

Figure 3-1

The regression line shows a good fit to the data points. Northern is positioned below the 2012/13 target line, at £20.0m.

Unit cost analysis

The following table compares the unit costs from the bottom-up and regression analyses and with the costs provided by Northern.

The bottom-up analysis gives a cost for Northern of £18.9m or £524/CSV.

We have therefore established the frontier costs by ranking all the GDN unit costs and taking the upper quartile value. The Northern and upper quartile values are shown the following table.

	CSV	2005/06 cost £m	Cost per £ per CSV
Northern submission	34906	20.0	572
Upper Quartile from regression analysis	34906	23.6	676
Bottom-up analysis	34906	18.3	524

Table 3-8

This shows the bottom up cost below the yellow line target costs in Figure 3-1, but that is to be expected. There are already two GDNs performing on or near the target line, our bottom up cost we believe denotes the minimum that can be ultimately expected, without significant changes of policy, or technology.

3.3.4 COMPANY PROPOSALS

The Work Management costs reported in the BPQ submission by Northern Network for the years 2006/07 to 2012/13 are shown below. This shows that neither Northern nor GDNs on average expect significant changes in Work Management costs over the period.

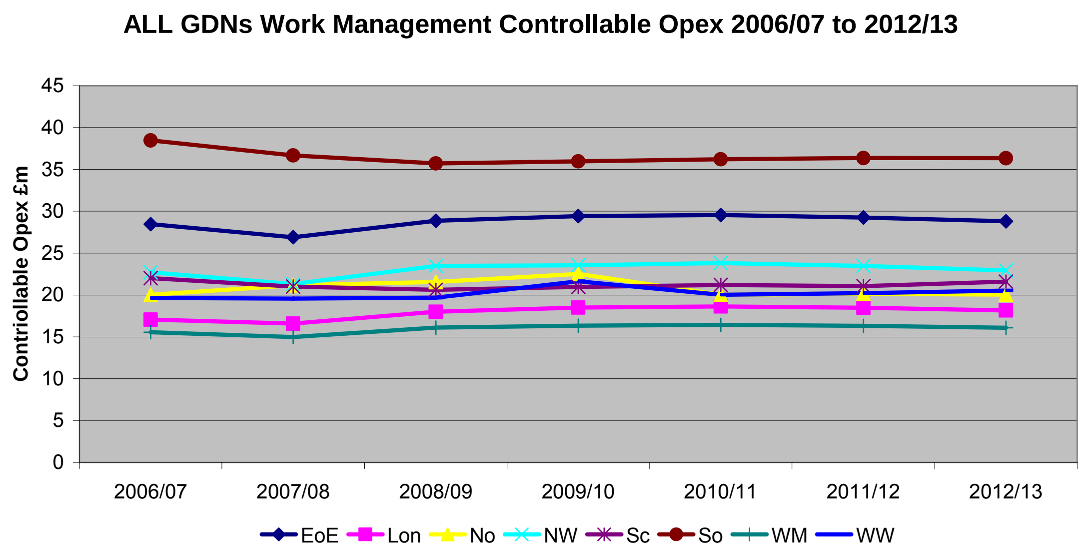

Figure 3-2

3.3.5 PROPOSED PROJECTIONS

We have shown that a combined driver of network length (<7bar), repair numbers and PRE numbers, is an appropriate explanatory variable to use when comparing network performance. To calculate the Work Management costs for the control period, we therefore need to take into account the planned growth in the network, and the variations in Repairs and PRE workloads.

The following table shows the PB Power forecasts of workload for Northern for repairs and emergency (from Sections 4 and 5), and the growth in Network length for Northern .

Northern	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
No. of repairs	23824	23202	22577	21985	21406	20844	20298	19768
No. of PREs	139564	138952	138352	137766	137191	136629	136078	135539
Length of network (<7bar) km	35476	35470	35469	35467	35466	35463	35461	35458

Table 3-9

The benchmark unit cost established in section 3.3.3 is applied to the composite variable (CSV) projections to establish the path of efficient Work Management costs for Northern. The results are shown in the following Table 3-11, below.

Specific costs

In reviewing the Capex expenditure plans for IT we have not been able to specifically identify the benefits planned to be delivered by each project. Having considered the total planned IS investment we are of the opinion that at least some of these projects would have been the subject of a cost benefit investment decision. We have assumed 20% of the total IT investment in Infrastructure and Systems would have been justified on a cost benefit basis, recognising that some investment will be to meet mandatory requirements. The total investments are listed in Table 3-10.

For 20% of the total investment, we have therefore calculated the minimum annual benefits which would be required for a standard cost benefit analysis. We have assumed the benefits will accrue over a 7 year period following the investment and have used a 6.25% per annum discount rate.

As this investment has been incurred after the start of the 2005/06 base year used in our regression analysis, it can be assumed that these saving are additional to those which could be expected from our conclusions from the regression analysis. These savings have been included in the allowed adjustments line in Table 3-11. We would expect most savings to result from the further automation of information flows to and from the field, particularly for Map and Engineering Drawing information. We would expect further optimisation of resource utilisation and supervision to be assisted by remote video transmission and automated data collection on job closure.

Northern	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	5 year total
GTMS Replacement	0.0	0.5	2.8	2.4	1.9	0.2	0.0	0.0	4.5
Strategic Emergency Despatch	0.0	0.0	1.1	4.0	0.0	0.0	0.0	0.0	4.0
Desktop/Mobile Refresh	0.3	2.3	0.0	0.0	0.0	1.9	0.0	0.0	1.9
Enduring Offtake Project	0.0	0.0	0.5	0.7	0.0	0.0	0.0	0.0	0.7
ISO Accreditation Project	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.8
FOMSA Support Re-Tender	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.9
FOMSA Technical Upgrade/Refresh	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	5.8
MasterMap Upgrade	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9
BP Optimisation	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.5
GDNS Support	0.0	0.0	0.8	1.7	1.5	0.0	0.0	0.0	3.1
GDN Change Requests	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	1.7
IS Infrastructure < £0.5m	0.5	1.0	0.0	1.7	0.5	0.5	0.5	0.8	4.1
IS Systems < 0.5m	0.4	0.0	0.0	1.5	1.9	1.4	0.0	0.0	4.8
Total IS Capex (excl GTMS)	1.3	3.2	2.4	10.3	9.9	4.8	6.3	0.8	32.1
Assumed Productivity 20% Total	0.3	0.6	0.5	2.1	2.0	1.0	1.3	0.2	6.4
Expected opex savings				-0.3	-0.6	-1.0	-1.2	-1.4	-4.4

Table 3-10

We believe that a general productivity improvement of 2% per annum in the benchmark costs is achievable, however, taking into account the IS improvements already outlined above this general productivity has been reduced to 1% per annum. This is in addition to the specific IT related items referred to above.

	2008/09	2009/10	2010/11	2011/12	2012/13
GDN BPQ Submission	**23.0**	**23.9**	**21.4**	**21.6**	**21.5**
Normalised Adjustments	**-1.7**	**-2.1**	**-1.7**	**-1.8**	**-1.8**
Normalised Submission	**21.3**	**21.8**	**19.7**	**19.8**	**19.7**
Combined Driver	**33921**	**33610**	**33308**	**33015**	**32729**
Benchmark (Ex RF RPE)	22.3	21.9	21.5	21.1	20.7
Baseline (Ex RF RPE)	18.9	18.5	18.2	17.9	17.6
Gap	-3.4	-3.3	-3.3	-3.2	-3.2
Convergence	-1.8	-2.2	-2.5	-2.8	-3.2
Recommended (Ex RF and RPE)	20.5	19.7	19.0	18.3	17.6
Recommended (Inc RF and RPE)	20.7	20.1	19.5	18.9	18.3
IS Productivity Adjustments	-0.3	-0.6	-1.0	-1.2	-1.4
Recommended (Inc RPE)	**20.4**	**19.4**	**18.5**	**17.7**	**16.9**

Table 3-11

This table shows the costs reported by the GDN in their BPQ submission and these costs adjusted by our normalisation process.

It then shows the build-up of our recommended costs as follows:

- The values of the workload driver over the period 2008/09 to 2012/13 and the benchmark unit costs which are multiplied to give the Benchmark performance. The Benchmark unit costs include PB Power's expected productivity improvements.

- Baseline performance: This is the GDN's BPQ reported performance in the base year tracked forward to 2012/13 taking account of PB Power's expected productivity improvements.
- The Gap, which is the difference between the Baseline performance and the Benchmark performance.
- Convergence: The convergence adjustment provides a glide path of cost to the 2012/13 Baseline performance.
- The sum of the Benchmark performance and the convergence gives the Recommended (Ex RF and RPE) cost.
- These costs are then adjusted for our Regional Factors (RF) and our Real Price Effects (RPE)
- The allowed adjustments for specific cost areas are then added to give the Recommended cost (Inc RPE).

3.3.6 REAL PRICE INCREASES

Section 2.7 sets out the approach to real price effects proposed by PB Power.

In addition to any efficiency adjustments, the Network costs have been normalised by adjustments to remove the GDN real price effects and the PB Power real price effect assumptions have subsequently been added in deriving the proposed allowances.

3.3.7 RECOMMENDATIONS

The result of the analysis, showing the normalised GDN forecast, the target cost and the line representing the recommended allowance cost is shown on the following graph.

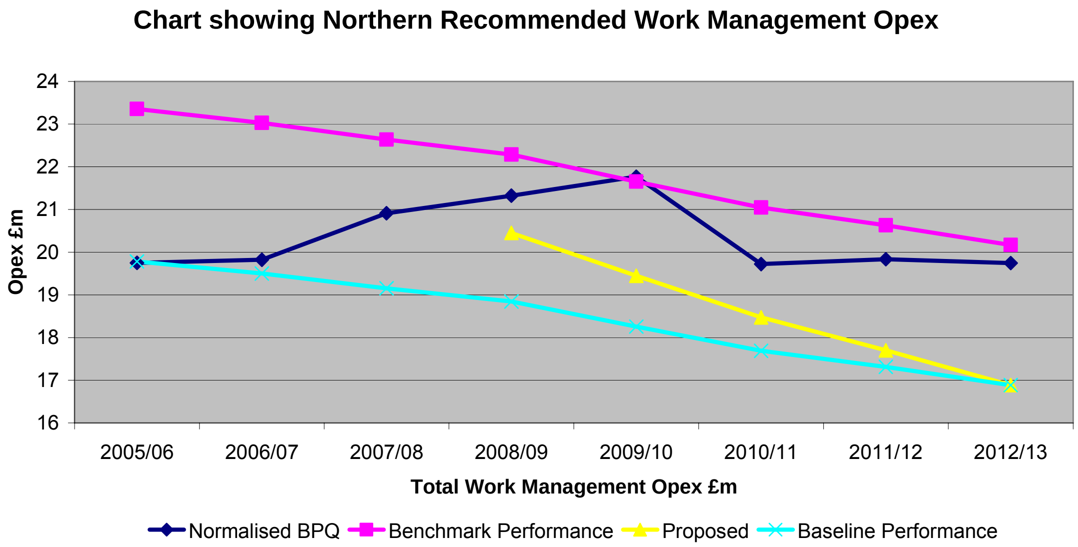

Figure 3-3

Note: the Benchmark and Baseline Performance lines include Adjustments

4 EMERGENCY

4.1 SUMMARY

Controllable Opex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission	7.7	7.7	7.8	8.2	8.4	**39.8**
Normalisation Adjustments	0.1	0.1	0.1	0.0	0.0	**0.3**
Normalised BPQ	7.8	7.8	7.9	8.2	8.4	**40.1**
Adjustments	0.6	0.2	-0.3	-1.0	-1.6	**-2.0**
Proposed	**8.4**	**8.0**	**7.6**	**7.2**	**6.8**	**38.0**

Table 4-1

4.2 POLICIES & PROCEDURES

4.2.1 INTRODUCTION

The primary roles of the emergency service are to:

- Receive emergency calls (usually electronically)
- Attend site within pre determined time scales
- Assess the situation on site and make safe as appropriate
- Call for support and assistance to deal with externally located gas escapes (if safe to do so the escape will be programmed and repaired within a defined period)
- Re-commission the supplies to consumers after mains/services renewal work
- Complete safety checks on re-programmed escape repairs (D2 rechecks)

NGN policy T/PL/EM1 - Policy for Dealing with as Escapes and other Emergencies - covers the management of actual and suspected gas escapes and other emergencies. These include the emission of fumes from gas appliances, fires or explosions where gas is thought to be the cause, and loss of supply.

The emergency service also carries out network asset related work and meter work (under contract), where such activities improve resource utilisation and do not impair the primary emergency service role.

4.2.2 SCOPE OF POLICES AND PROCEDURES

The policy T/PL/EM1 is applicable in relation to NGN's obligations as a Gas Transporter, an Emergency Service Provider and the Network Emergency Co-ordinator. It also applies in instances where NGN has entered into commercial arrangements to operate as an Emergency Service Provider for a third party e.g. another Gas Transporter or other Gas Conveyer.

4.2.3 REVIEW AND UPDATE PROCESS

Appendix 1 reviews the financial and technical framework under which NGN operates, the structure they utilise to manage their assets effectively and the key policies they adopt and maintain to ensure they meet their statutory and licence obligations and other regulatory requirements.

4.2.4 EFFICIENCY AND PRODUCTIVITY

The cost of implementing the policy is influenced by obligations under the Network's Safety Case and the Gas Act regarding standards of performance for dealing with Public Reported Escapes (PREs). It is also influenced by the availability of fill-in work between PRE call-outs including work obtained through contracts with third party organisations (e.g. meterwork see section 4.3.4.) or other fill-in work available internally.

4.3 HISTORICAL PERFORMANCE

4.3.1 INTRODUCTION

In this section the historical performance of the Network between 2002/3 and 2006/07 is reviewed in an attempt to establish the proposed efficient level of costs associated with the Emergency Service (ES).

Where possible both workload and cost trends have been analysed although for the reasons outlined in 4.2.2 historical trends of PREs are not always helpful when attempting to forecast future work volumes since these are influenced by factors beyond the control of the Network.

4.3.2 DEFINITION OF ACTIVITY

The Emergency Service is the process set up to discharge the Networks obligations, under the Gas Safety (Management) Regulations(GS(M)R) 1996, to respond to Public Reported Gas Escapes (PREs). However ES staff and First Call Operatives (FCOs) also undertake other work activities including meterwork for external organisations and other internal activities such as leakage surveys.

There are two categories of PREs:

- uncontrolled, i.e. the source of the leak cannot be isolated by turning off a valve, or
- controlled if the source of the leak can be isolated.

The majority of PREs are uncontrolled.

All PREs are visited by emergency service FCOs. There is a requirement under the Network’s Safety Cases and Overall Standards of Performance to attend to uncontrolled PREs within 1 hour of receiving the report and to controlled PREs, within 2 hours. It is accepted that attending all PREs within these timescales may not be practical on all occasions and some tolerance is allowed. The current standard of performance target is to attend to 97% for uncontrolled PREs within 1 hour, and 97% of controlled PREs within 2 hours.

Once the FCO has carried out an investigation the PRE is defined as either an Internal PRE (i.e. emanating from a source inside a building down stream of the emergency control valve), an External PRE (i.e. emanating from a source outside a building upstream of the emergency control valve and including the valve) or a No-Trace which is a false alarm.

There are two main cost drivers for the Emergency activity; the first is the requirement to attend to uncontrolled gas escapes within 1 hour and the second is the volume of PREs.

The requirement to attend uncontrolled PREs within one hour, results in Networks having to deploy FCOs throughout their areas on a 24/7 basis. This may lead to high levels of unproductive time (i.e. waiting time) since the number of PREs fluctuates and is influenced by factors beyond the management's control such as weather and media focus on gas related incidents, including explosions and carbon monoxide poisonings.

Minimising waiting time is a key management objective when attempting to minimise the cost of the Emergency Service.

During the current price control period a significant source of fill-in work has been the Network's meterwork contracts with meter asset managers such as Onstream and National Grid Gas Metering.

The emergency teams generally need to be located geographically throughout a network in order to respond appropriately to all emergency calls.

4.3.3 ESTABLISH UNDERLYING COSTS.

Cost normalisation

Section 2.5.1 gives details of the generic normalisation adjustments which have been carried out. For Emergency, the principal normalisation adjustments are outlined below.

- **Cost transfer** – there are no cost transfer associated with Emergency.
- **GDN reallocation** – the outcome of reallocation process in which NGN identified the changes to the allocation of costs to reflect our proposed allocation of sub-activities2.
- **Accounting adjustments** – which have been provided by Ofgem
- **Pensions adjustments** – these adjustments are the net adjustments between NGN's reported pension costs and the standard pension costs used by PB Power
- **Removed costs** – there are no removed costs associated with Emergency.

The detail of the adjustments to the BPQ costs submitted by NGN for Northern network is given in the following table.

Normalisation Adjustments	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Cost transfer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GDN reallocation	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	3.3
Ofgem Accounting Adjustments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pension Adjustments	0.1	-0.3	-0.4	-0.4	-0.4	-0.3	-0.4	-0.4	-2.5
Removed costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**0.4**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**	**0.8**

Table 4-2

In this Section all cost are on a normalised basis as described above.

[2] Full details of the GDN reallocation are given in Appendix 6

Workload and costs

The following figure shows the path of PREs over the period 2002/03 to 2006/07. It shows that the number of external PREs has declined over the period, and that the number of internal PREs declined and then increased.

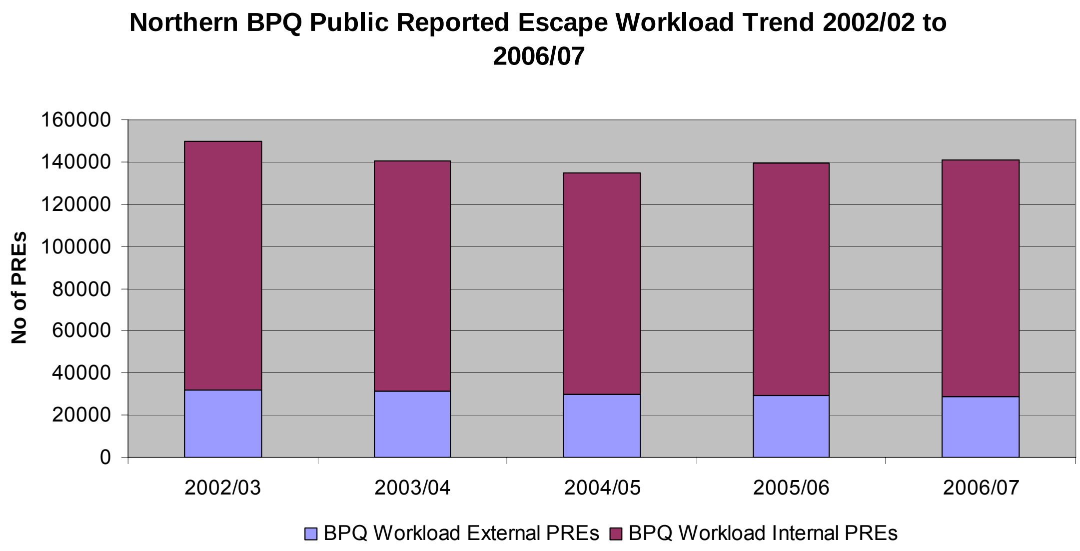

Figure 4-1

Figure 4-2 shows the Network's number of total PREs is below the average GDN and the historical trend of total PREs is consistent with the general trend over the period.

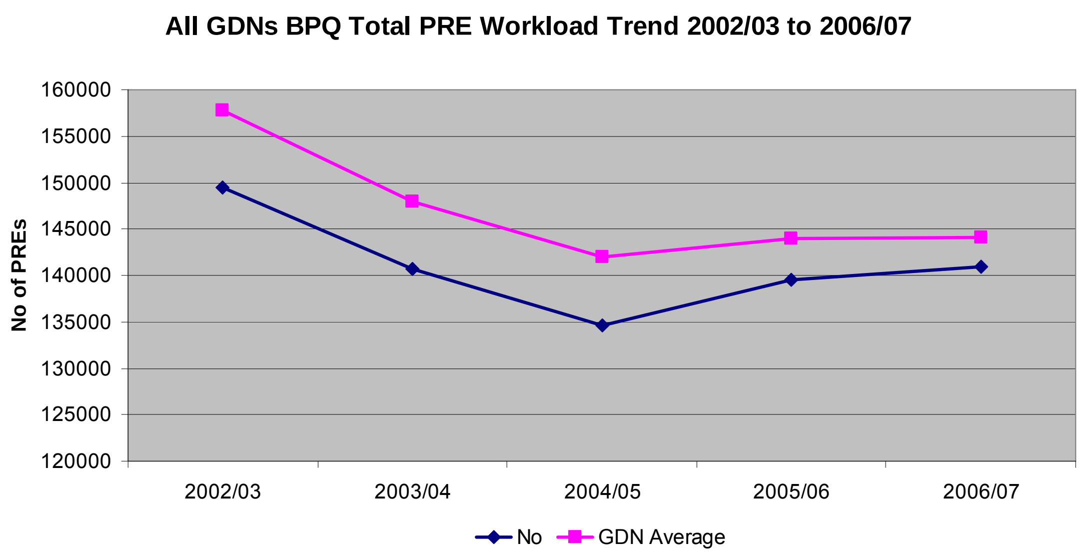

Figure 4-2

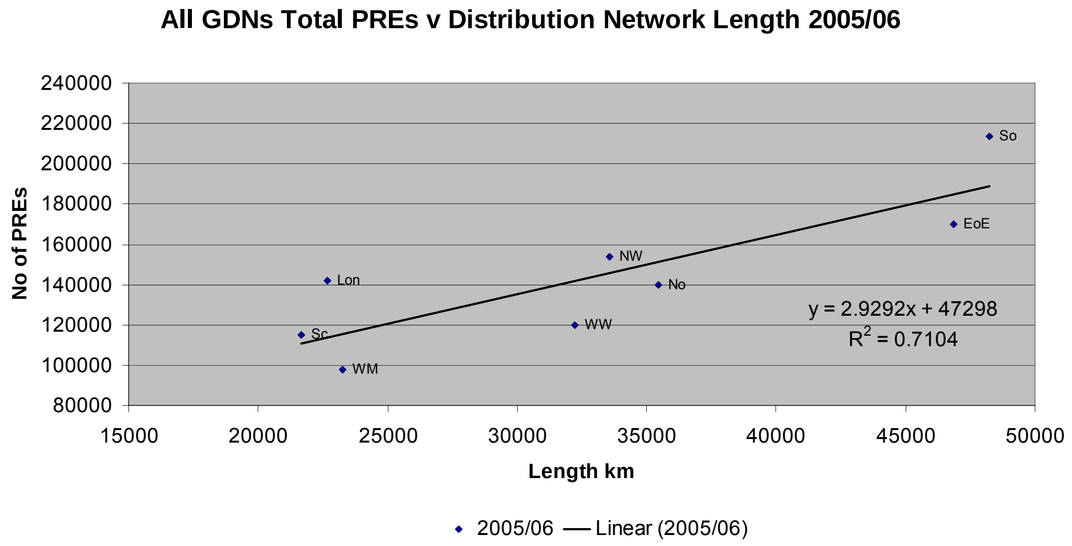

Figure 4-3

Figure 4-3 shows the PRE workload is generally commensurate with the network's size expressed in terms of network length.

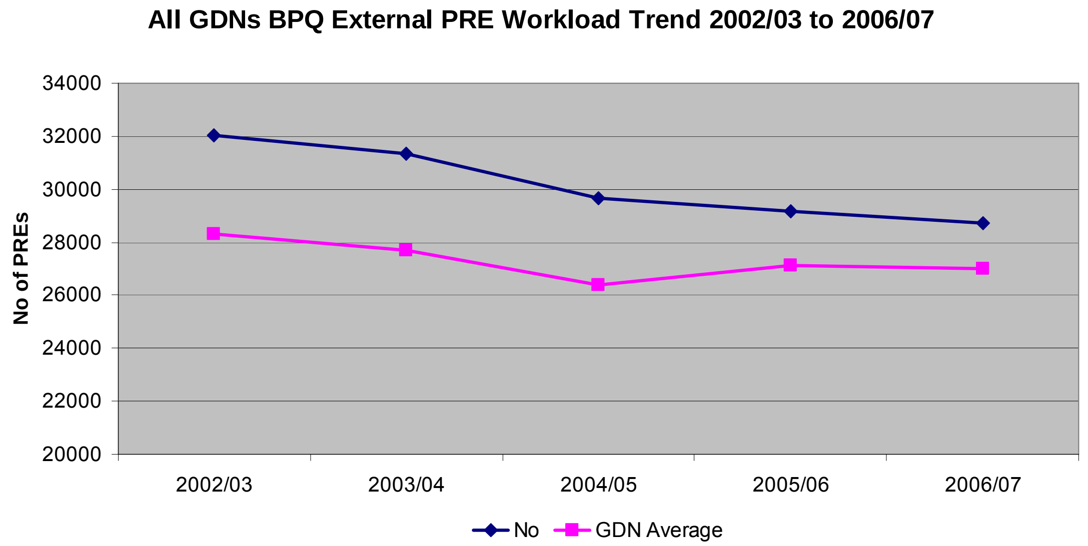

Figure 4-4

The number of External PREs is influenced by the mains replacement programme, operating pressures, management initiatives (such as gas conditioning and those designed to reduce interference damage) and the effects of asset ageing (see section 4.3.3). Figure 4-4 shows that, historically, the various factors influencing the number of external PREs have generally balanced out across all GDNs. In Northern the number of external PREs has declined despite these factors.

One of the key drivers of emergency costs is the number of PREs. We have therefore calculated the unit costs for the emergency service in terms of £ per PRE.

In this analysis no distinction has been made between Internal, External and No-trace reports and hence the unit cost is the average cost of these three categories. The following chart shows the unit costs (£ per PRE) for the emergency service in 2005/06, based on normalised costs.

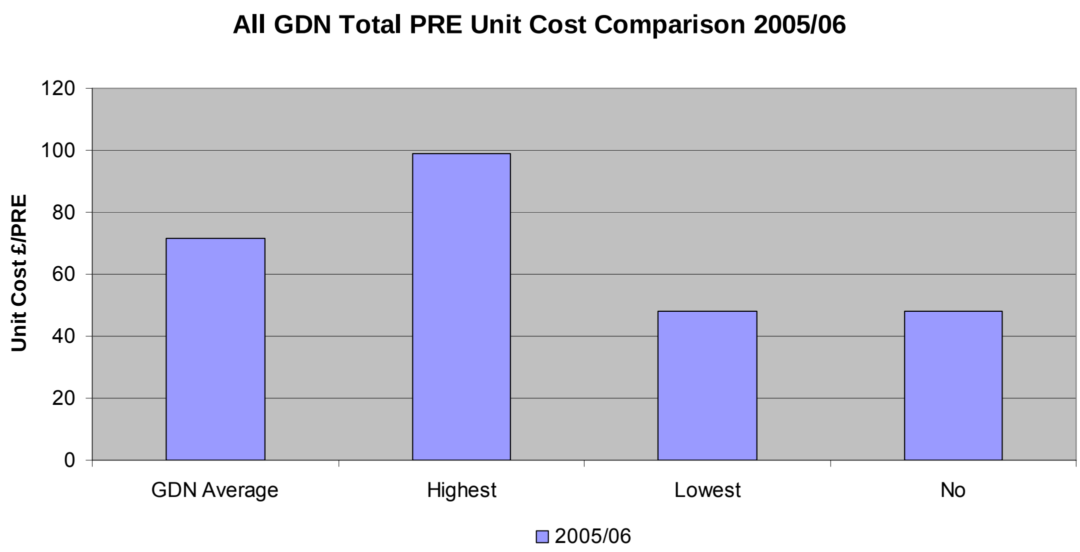

Figure 4-5

This shows that Northern has one of the lowest unit costs of all the GDNs.

Historical costs

The table below shows the cost of the process over the two years 2005/06 – 2006/07. The Network has provided costs for the period 2002/03 - 2004/05 but due to different organisational structures in those years we cannot establish whether they are comparable with 2005/06 costs.

Expenditure breakdown (2005/06 prices)	2005/06	2006/07
Contract	1.2	0.8
Direct	4.9	5.9
Materials	0.0	0.0
Other	0.6	0.6
Total	6.7	7.3

Table 4-3

4.3.4 PROPOSE EFFICIENT LEVEL OF COSTS

Section 2 sets out the approach we use to set benchmark costs. The following techniques are used:

- Regression analysis
- Bottom-up analysis.
- Unit cost analysis

To use these techniques we will use total PREs as the explanatory variable, as discussed above.

Regression analysis

We have reviewed the most appropriate driver of costs. The number of PREs is clearly an important driver. The monitoring of emergency repairs which can safely be reprogrammed (D2 rechecks) also forms a component of the emergency First Call Operative (FCO) activities, and this workload is not counted in PRE numbers. The cost of carrying out D2 rechecks is included as part of the bottom-up analysis described below together with site monitoring following service relays.

We have concluded that a composite variable (CSV) as follows is most appropriate.

CSV = 0.8 x total no. of PREs/Average no. of GDN PREs

+ 0.2 x no. of repairs / Average no. of GDN repairs.

The component variables of the CSV are each scaled by their respective average GDN values so that the balance between the components of the CSV is independent of the choice of units used to quantify each component variable.

The weights reflect the assumed proportion of FCO time allocated to responding to PREs and to D2 rechecks together with site monitoring activities. These latter activities are driven by the number of repairs. (see Appendix 3)

The following graph shows the regression analysis using this CSV as an explanatory variable.

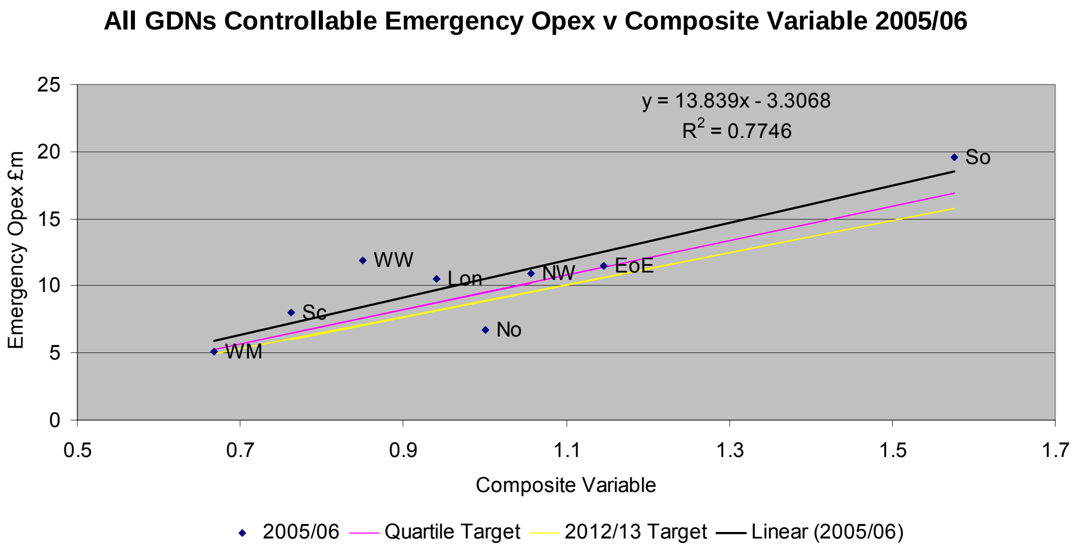

Figure 4-6

The regression analysis gives an upper quartile cost for Northern of £9.5m.

In rural, sparsely populated areas, minimising waiting time can be more difficult than in more densely populated urban areas since there are fewer FCOs and they are more widely dispersed. We have examined various factors which reflect sparcity and applied them to the data set, but have found no improvement to the regression fit.

In the chart above, the r^2 value, a measure of the fit of the data, is 0.77 and we have therefore reviewed additional analysis techniques. We have considered using a reduced data set by removing outliers, but the spread of the data points is such that there are no clear data points for exclusion. Instead, we have carried out a bottom-up analysis to test whether the upper quartile unit cost is reasonable.

Bottom up analysis

The bottom-up cost analysis is described in Appendix 3.

Assuming that meterwork is retained, a unit cost of £43.6/PRE was obtained from the bottom-up analysis.

The GDNs have explained that competitive pressures may mean that they will lose some or all of their metering contracts, and this will increase the unproductive time of FCOs and therefore increase the costs of the emergency service. The cost impacts of a loss of meter work are discussed in Appendix 3. The impact of the loss of meterwork on our cost projections is considered as a specific cost in section 4.4.4.

Unit cost analysis

The benchmark costs obtained in this section are for meterwork being carried out by GDNs at the level pertaining in 2005/06.

The following table compares the unit costs obtained from the different analyses. The upper quartile unit cost is the cost for Northern obtained from the regression analysis divided by the number of PREs in 2005/06.

Unit Cost (£/PRE)	2005/06
Northern	48.1
Upper Quartile	68.2
Bottom up analysis	43.6

Table 4-4

This analysis suggests that Northern's emergency costs are below the upper quartile level from the regression analysis and above the bottom-up assessment of unit costs.

4.4 FORECAST

4.4.1 INTRODUCTION

In this Section the Network's forecast for workload and costs are reviewed and proposed changes (and the reasons for them) are described. The benchmark analysis and a gap closure approach are used to derive the recommended allowances for the Network.

The impact of real price increases and specific additional costs (e.g. additional waiting time as a result of losing meterwork) are subsequently considered and, where appropriate, added to the recommended allowances.

4.4.2 COMPANY PROPOSALS

The following graph shows Northern's forecasts of emergency service workload over the period 2006/07 to 2012/13.

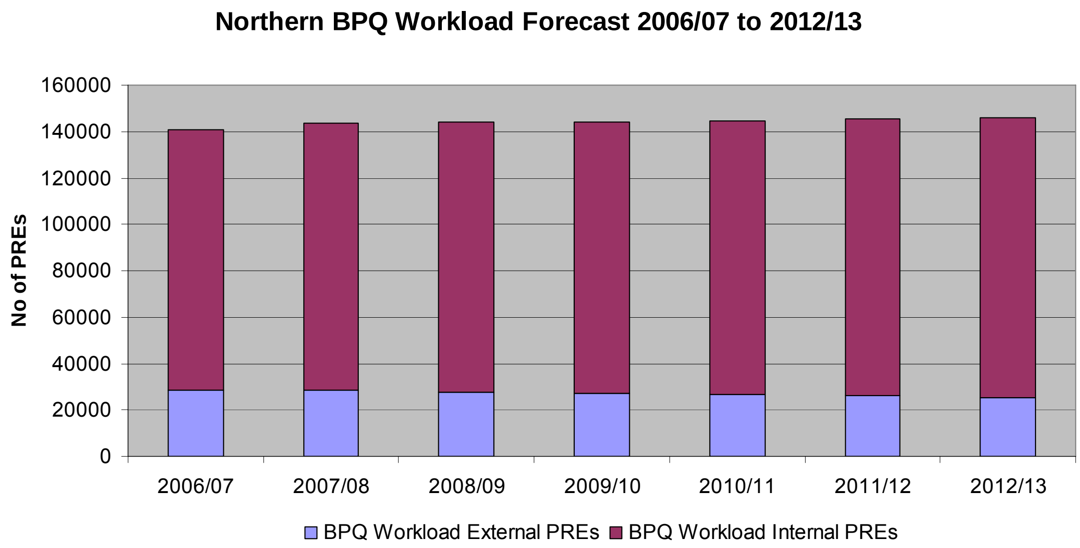

Figure 4-7

Northern is forecasting an increasing trend in internal PREs and a decreasing trend in external PREs with total PREs increasing across the period.

The details are shown in the following table together with the figures for the average across all GDNs for comparison.

	Northern	% change on 2005/06	Average GDN	% change on 2005/06
Internal PREs				
2005/06	110412	N/A	116823	N/A
2008/09	116103	5.15%	117732	0.78%
2012/13	120550	9.18%	118585	1.51%
External PREs				
2005/06	29152	N/A	27129	N/A
2008/09	27770	-4.74%	26741	-1.43%
2012/13	25411	-12.83%	26045	-4.00%
All PREs				
2005/06	139564	N/A	143952	N/A
2008/09	143873	3.09%	144474	0.36%
2012/13	145961	4.58%	144631	0.47%

Table 4-5

Overall, Northern is forecasting changes in total PRE numbers higher than the average for all GDNs.

The following table shows Northern's forecast costs for the period 2006/07 to 2012/13. It shows that the forecasts are increasing over the period, reflecting in part the increase in workload predicted by Northern.

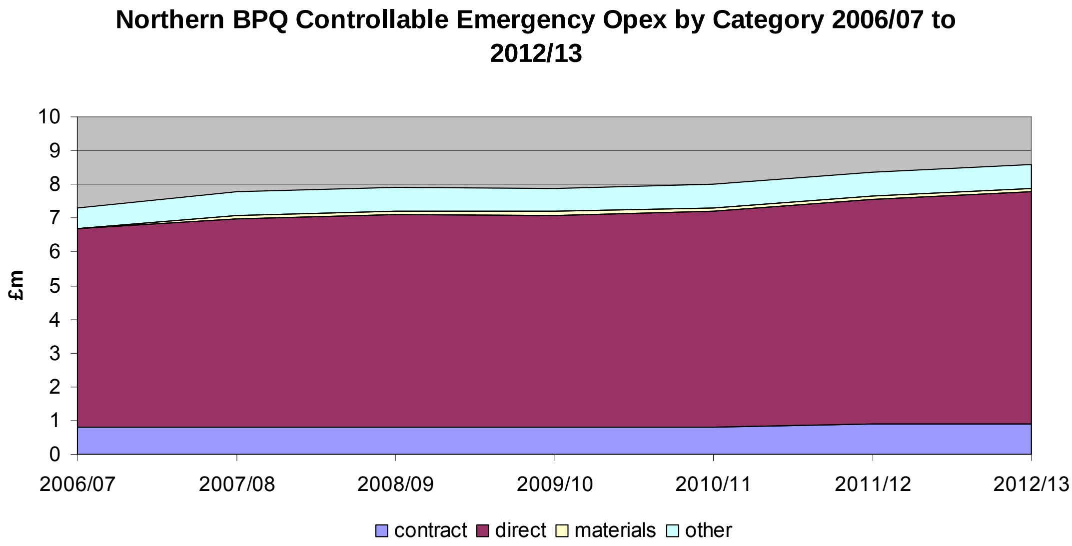

Figure 4-8

4.4.3 PROPOSED PROJECTIONS

This section contains our assumptions, proposed workload and cost trends and reasons for any adjustments to the Networks proposals.

Internal PREs

Network projections for Internal PRE workload range from slightly increasing through level to slightly reducing trends.

Networks have expressed the view that increasing housing stocks and additional public concern about CO risks have the potential to generate additional Internal PREs. No evidence (other than anecdotal) has been found in the BPQ submissions to enable these factors to be quantified. However about 200,000 new houses are built each year nationally and with a national housing stock around 25 million houses this amounts to an increase of approximately 0.8%/yr. On this basis internal PREs might be expected to increase by the same amount. In addition there are two other factors which tend to drive up the volume of Internal PREs. These are the ageing of internal pipe work and of appliances in existing houses and increasing public concern about the risk of CO poisoning. In practice it is very difficult to predict Internal PRE trends and historically the trend in the Network is neither clearly reducing nor increasing. Consequently a neutral stance has been adopted. Our assumption is that the level of Internal PREs will remain constant throughout the plan.

External PREs

Although no precise relationship between the level of External PREs and mains replacement activity has been found in the BPQ submissions, it is assumed that replacing old iron pipe systems with new PE systems will reduce External PREs.

The following graph shows that there is a reasonable relationship between the number of repairs and the km of non-PE main, and that the falling number of repairs as the volume of PE main increases will also be expressed through a falling number of external PREs.

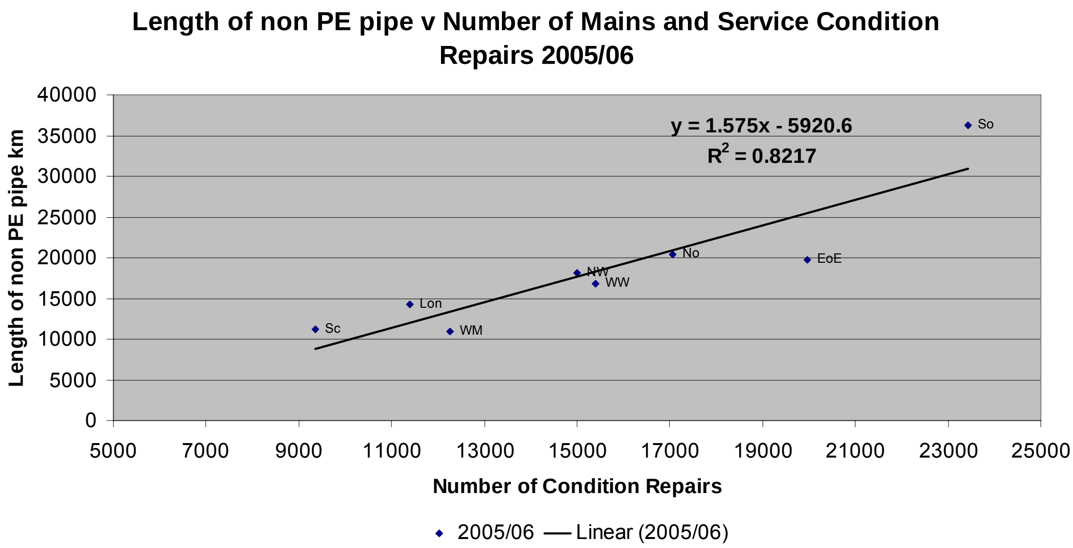

Figure 4-9

External PREs can arise because of the condition of the main or service, interference damage, and in a significant proportion of cases no gas escape is found.

Based on the historical experience of GDNs, the following assumptions have been made regarding the proportion of external PREs by cause in 2005/06.

External PREs	Percentage of PREs
Condition	66%
Interference damage	12%
No-trace	22%
Total	100%

Table 4-6

We have assumed that the mains replacement programme will remove 4.0% per annum of the iron system and that this will remove 3.0% per annum of the condition based External PREs. We have also assumed that the proportion of External PREs that arise from Interference Damage will reduce by 1% per annum and that the proportion of External PREs that cannot be traced (No-Traces) remains constant.

The overall impact will be to reduce total External PREs by 2.1% per annum throughout the plan period.

Asset ageing may affect the level of external PREs. Where pipes are in corrosive environments, typically clay, then the corrosion process will continue to generate escapes. Pipes in environments that have changed considerably since they were installed can experience additional strain from increasing traffic volumes and axle weights leading to pipe movement and ultimately joint leakage or fracture. We have assumed that appropriate levels of gas conditioning will continue so as to mitigate joint leakage. We do not consider ageing to be a significant factor affecting changes in PREs, but recommend that the impact of these effects on the trend in external PRE numbers is re-examined as part of the 2006/07 update.

The following table summarises our workload assumptions and their impact on the total PRE workload.

	PB Power proposed workloads	% change on 2005/06
Internal PREs		
2005/06	110412	N/A
2008/09	110412	0.00%
2012/13	110412	0.00%
External PREs		
2005/06	29152	N/A
2008/09	27354	-6.17%
2012/13	25127	-13.81%
All PREs		
2005/06	139564	N/A
2008/09	137766	-1.29%
2012/13	135539	-2.88%

Table 4-7

The following graph shows our workload assumptions for each year.

Northern Adjusted Emergency Workload 2006/07 to 2012/13

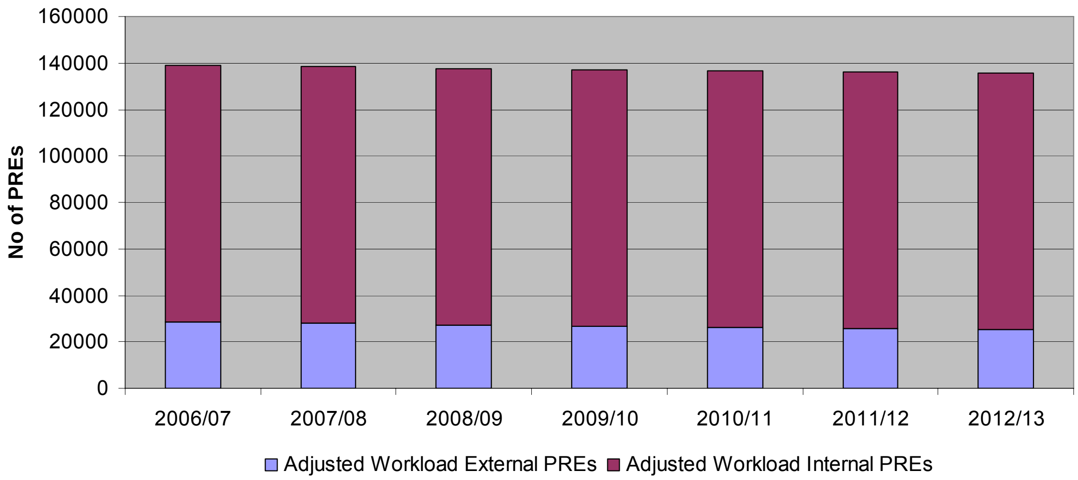

Figure 4-10

Figure 4-10 shows the gradually reducing trend in total PREs, largely as a result of the impact of the Networks mains replacement programme on External PREs.

4.4.3.1 PB Power Costs Projections

Applying the upper quartile unit costs (Table 4-4) to the workload projections shown in Figure 4-10 gives the recommended operating expenditure allowance shown in Figure 4.11. This assumes no loss of meterwork throughout the plan period.

In making these projections we have assumed that management initiatives (e.g. better incentive schemes and smarter ways of working) should produce productivity gains above those assumed by the Network. These will result in reduced working hours for direct labour and in a reduction in the number of contract labour operatives employed.

Overall this is included in our projections as an assumed productivity improvement of 1% per annum.

The implications of the potential loss of meterwork are considered in section 4.4.4.

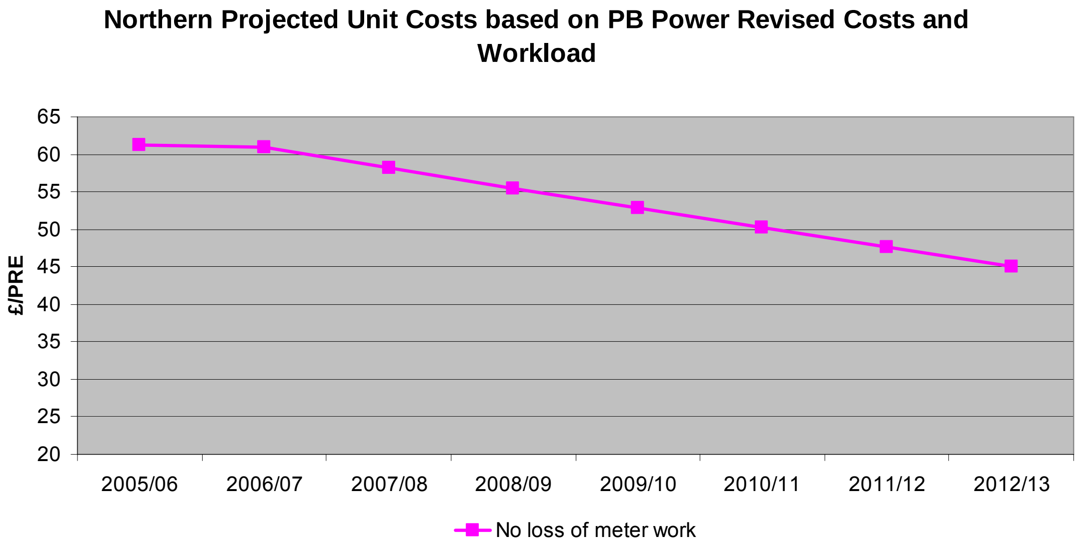

Figure 4-11

4.4.4 SPECIFIC COST AREAS

Loss of meterwork

To meet its PRE standards of service the Network has to deploy sufficient FCOs to deal with peak workload levels. Emergency workload tends to peak in the morning and evening, leaving potentially unproductive time (i.e. waiting time) in the middle of the day. During this time FCOs are utilised for meterwork and other maintenance work. Meterwork is available via contracts with third party meter asset owners such as Onstream and NGG Metering.

Some GDNs have explained that their cost structures, which are driven by the requirement to meet the emergency service standards of performance, will mean that they will be unable compete with new dedicated meter replacement companies and so will lose their meterwork contracts.

NGN's BPQ submission does not addresses changes in its meter workload. Metering activities are delivered through UUOL and it is considering increasing the amount of meter work undertaken.

We believe that generally a proportion of meter contracts will be lost and that this will increase the cost of the emergency service as discussed in Appendix 3.

In Appendix 3 we propose that the networks will retain, as a minimum, 33% of the 2005/06 meter workload and our assumption for cost projection purposes is that 45% of the 2005/06 meterwork will be retained across the period 2008/09 to 2012/13. We recognise that different market conditions will apply in different GDN areas, but we are not in a position to assess these conditions and have therefore applied this percentage of retained meter workload on a common basis across all GDNs.

Based on our calculations in Appendix 3, the loss of metering could increase the benchmark unit cost by £5.4/PRE. We have applied this as an allowed adjustment after calculating the recommended costs which assume that the 2005/06 volumes of meterwork are retained.

The following table shows the allowed cost for Northern for the loss of meterwork.

	2008/09	2009/10	2010/11	2011/12	2012/13
PRE workload	137766	137191	136629	136078	135539
Cost of Meterwork loss £m	0.7	0.7	0.7	0.7	0.7

Table 4-8

4.4.5 <u>REAL PRICE INCREASES</u>

Section 2.7 of this report sets out the real price effects assumed by NGN in their BPQ proposals and also the real price effects proposed by PB Power.

The Network costs have been normalised by adjustments to remove the Network real price effects and the PB Power real price effect assumptions have subsequently been added in as part of the process used to derive the recommended allowances.

4.4.6 <u>RECOMMENDATIONS</u>

Proposed allowances

The proposed workloads and allowances are shown in the following table.

	2008/09	2009/10	2010/11	2011/12	2012/13
GDN BPQ Submission	**7.7**	**7.7**	**7.8**	**8.2**	**8.4**
Normalised Adjustments	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**
Normalised Submission	**7.8**	**7.8**	**7.9**	**8.2**	**8.4**
Composite Regression Driver	**0.973**	**0.964**	**0.956**	**0.948**	**0.940**
Benchmark (Ex RF RPE)	8.9	8.7	8.5	8.3	8.1
Baseline (Ex RF RPE)	6.2	6.1	6.0	5.8	5.7
Gap	-2.6	-2.6	-2.5	-2.5	-2.5
Convergence	-1.4	-1.7	-2.0	-2.2	-2.5
Recommended (Ex RF and RPE)	7.5	7.0	6.6	6.1	5.7
Recommended (Inc RF and RPE)	7.6	7.3	6.9	6.5	6.1
Allowed Adjustments	0.7	0.7	0.7	0.7	0.7
Recommended (Inc RPE)	**8.4**	**8.0**	**7.6**	**7.2**	**6.8**

Table 4-9

This table and Figure 4-12 shows the costs reported by the GDN in their BPQ submission and these costs adjusted by our normalisation process.

It then shows the build-up of our recommended costs as follows:

- For each year in the period 2008/09 to 2012/13, the values of the workload driver and the benchmark unit cost are multiplied to give the Benchmark performance. The Benchmark unit costs include PB Power's expected productivity improvements.
- Baseline performance: This is the GDN's BPQ reported performance in the base year tracked forward to 2012/13 taking account of PB Power's expected productivity improvements.
- The Gap, which is the difference between the Baseline performance and the Benchmark performance.
- Convergence: The convergence adjustment provides a glide path of cost to the 2012/13 Baseline performance.

- The sum of the Benchmark performance and the convergence gives the Recommended (Ex RF and RPE) cost.
- These costs are then adjusted for our Regional Factors (RF) and our Real Price Effects (RPE)
- The allowed adjustments for specific cost areas are then added to give the Recommended cost (Inc RPE).

Chart showing Northern Recommended Emergency Opex

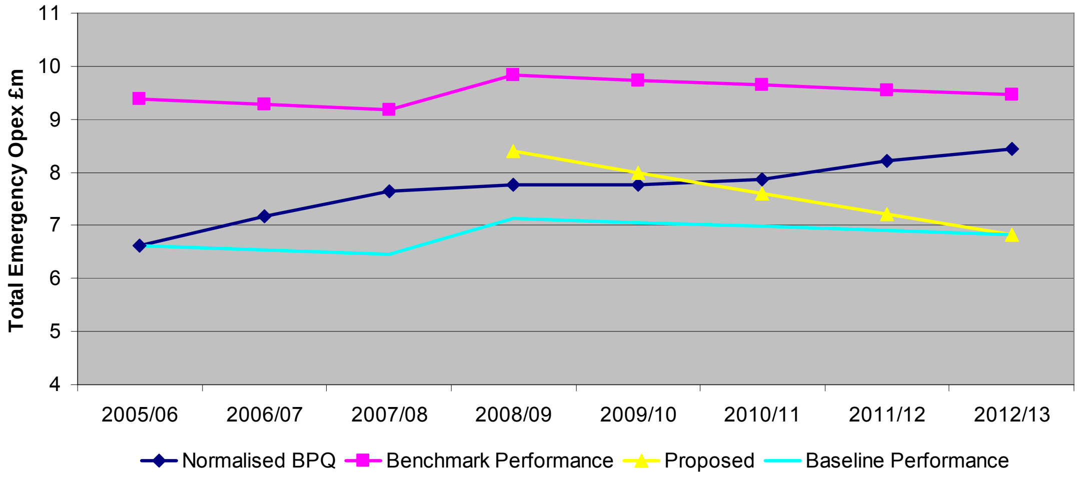

Figure 4-12

Note: the Benchmark and Baseline Performance lines include Adjustments

5 REPAIR

5.1 SUMMARY

Net Opex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission						
Repairs	10.6	10.9	11.0	11.2	11.4	**55.1**
Total	**10.6**	**10.9**	**11.0**	**11.2**	**11.4**	**55.1**
Normalisation Adjustments						
Adjustments	-0.2	-0.2	-0.2	-0.2	-0.2	**-1.0**
Removed Costs	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**-0.2**	**-0.2**	**-0.2**	**-0.2**	**-0.2**	**-1.0**
Normalised BPQ						
Repairs	10.4	10.7	10.8	11.0	11.2	**54.1**
Total	**10.4**	**10.7**	**10.8**	**11.0**	**11.2**	**54.1**
Adjustments						
Allowed Costs	0.0	0.0	0.0	0.0	0.0	**0.0**
Workload Adjustment	-0.5	-0.6	-0.6	-0.6	-0.6	**-2.9**
Efficiency Adjustments	-0.4	-0.9	-1.2	-1.5	-1.8	**-5.7**
Total	**-0.9**	**-1.4**	**-1.7**	**-2.1**	**-2.4**	**-8.6**
Proposed						
Repairs	9.5	9.3	9.1	8.9	8.7	45.5
Total Net	**9.5**	**9.3**	**9.1**	**8.9**	**8.7**	**45.5**

Table 5-1

5.2 POLICIES & PROCEDURES

NGN policy T/PL/EM1, Policy for Dealing with Gas Escapes and other Emergencies, covers the management of actual and suspected gas escapes and other emergencies. These include the emission of fumes from gas appliances, fires or explosions where gas is thought to be the cause, and loss of supply. Procedure T/PR/EM/74 covers work procedures for locating and repairing gas escapes on the network and T/PR/LC/22 describes the approved methods of repair for mains, services and risers.

Appendix 1 reviews the financial and technical framework under which the Network operates, the structure it utilises to manage its assets effectively and the key policies it adopts to ensure it meets its statutory and licence obligations and other regulatory requirements.

The T/PL/EM1 policy is applicable to the Network's obligations as a Gas Transporter, an Emergency Service Provider and the Network Emergency Co-ordinator. It also applies in instances where the Network has entered into commercial arrangements to operate as an Emergency Service Provider for a third party e.g. another Gas Transporter.

The cost of implementing this policy is influenced by obligations under the Gas Safety (Management) Regulations which state "...where any gas escapes from a network the person conveying gas in the part of the network from which the gas has escaped shall, as soon as is reasonably practicable after being so informed of the escape, attend the place where the gas is escaping, and within 12 hours of being so informed of the escape, he shall prevent the gas escaping". In practice the Network undertakes risk assessments and when appropriate re-programmes to prioritise the work, minimise nuisance and improve efficiency. If the Network is tasked with increasing the proportion of repairs currently being completed within 12 hours this would have adverse cost implications.

5.3 HISTORICAL PERFORMANCE

5.3.1 INTRODUCTION

The requirement to undertake repairs in response to Public Reported Escapes (PREs) is fundamental to the safe operation of the Network. The repair process, in common with Emergency, operates 24 hours a day & 365 days a year although most of the work is within normal working hours. Whilst safety is the always the primary concern, the managers of the process must also concern themselves with the prioritisation of the repairs, ensuring that they have adequate resources and that these are efficiently employed. Matching the available resource with the workload is a key factor in the efficiency of the process. Over-resourcing will achieve prompt repairs, but at the risk of the teams being under-employed should the workload decline. Under-resourcing will delay repairs and generate additional site monitoring costs where permanent repair is pending. In addition to this key relationship, managers will be monitoring a range of other issues; team availability for the next urgent repair, the type and quality of the repairs made, highway occupation and maintenance of road-signs, barriers and lamps around excavations, over-long working hours and customer issues such as access, and disconnection where a service pipe is found to be leaking.

5.3.2 DEFINITION OF ACTIVITY

The Repair activity is the process set up to repair gas escapes from gas distribution assets[3] upstream of (and including) the emergency control valve. The activity is distinct from Emergency, which provides the first response to a PRE and which is focused primarily on safety, with investigation and monitoring as important, but secondary activities. In some cases, usually service escapes, replacement, rather than repair is the preferred option and the Repair activity stops at the point when the gas escape is stopped and the site made safe.

The total number of repairs is split into four categories:

- Mains – condition
- Mains - interference repairs
- Services – condition
- Services - interference repairs

Condition repairs typically arise as a result of pipe corrosion or leaking joints and interference repairs arise as a result of damage to the Network's assets caused by third party activities usually in the course of street-works by other utilities.

Workload details are reported in section C18 of the Network BPQ workbook and repair costs reported in section B1 of the Financial and Opex tables.

[3] Mains and services operating at pressures up to 7bar

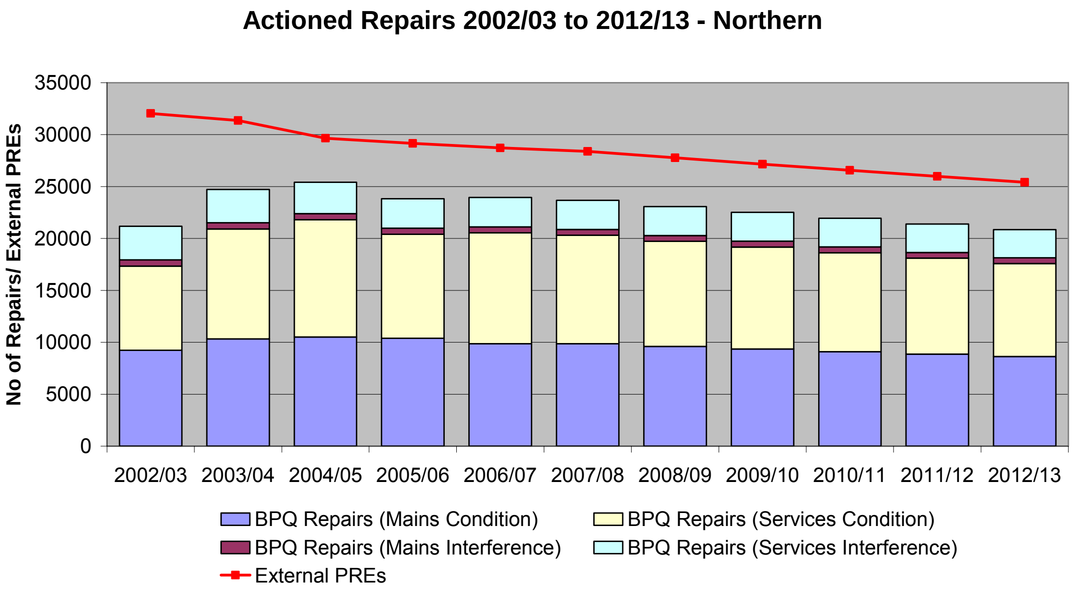

Figure 5-1

External PRE - workload

External PREs are a sub-set of the uncontrolled PREs described in section 4.3.2 above. Almost all confirmed external PREs are escapes upstream of the emergency control valve, and not able to be isolated by closing a valve.

External PREs are showing a downward trend due to the influence of pressure management, gas conditioning and the mains and services replacement programme. Volumes will vary in response to external factors as these PREs are weather sensitive and a cold winter will generate higher levels of reports through raised pressures. Ground movement from drying, or frost heave, will also increase the number of PREs as will public awareness following an incident. Not all PREs result in a repair and approximately one quarter are classified as “no escape found”

Repairs - workload

Generally, the number of repairs can be expected to follow the number of confirmed external PREs (total external PREs less those where no escape is found) although this is partially offset by sites where it is necessary to repair more than one escape. For example, in some instances more than one mains joint repair may be required to clear the site of gas.

The relatively low level of repairs in 2002/03 and 2003/04 has not been explained but is thought to be due to under-recording.

Condition Repairs

Condition repairs to mains and services form the major workload. Typically repairs are to the metallic (cast iron, spun iron, ductile iron mains and steel mains and services) parts of the system with mains joints and fractures, and corroded steel services being the most common types of failure.

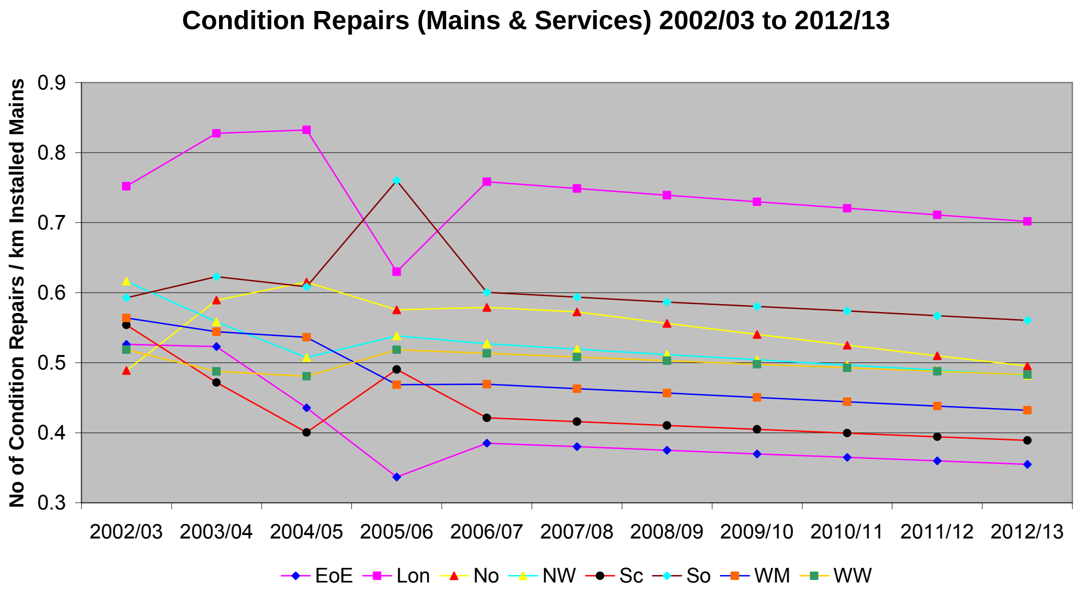

Figure 5-2

The chart shows that repairs/km of main in service is trending downwards in all Networks. The effect of the replacement programme[4] is significant and the chart below shows how the proportion of iron and steel (non-PE) mains is falling as de-commissioning reaches (in 2007/08 for most Networks) the level to be maintained over the next 25 years.

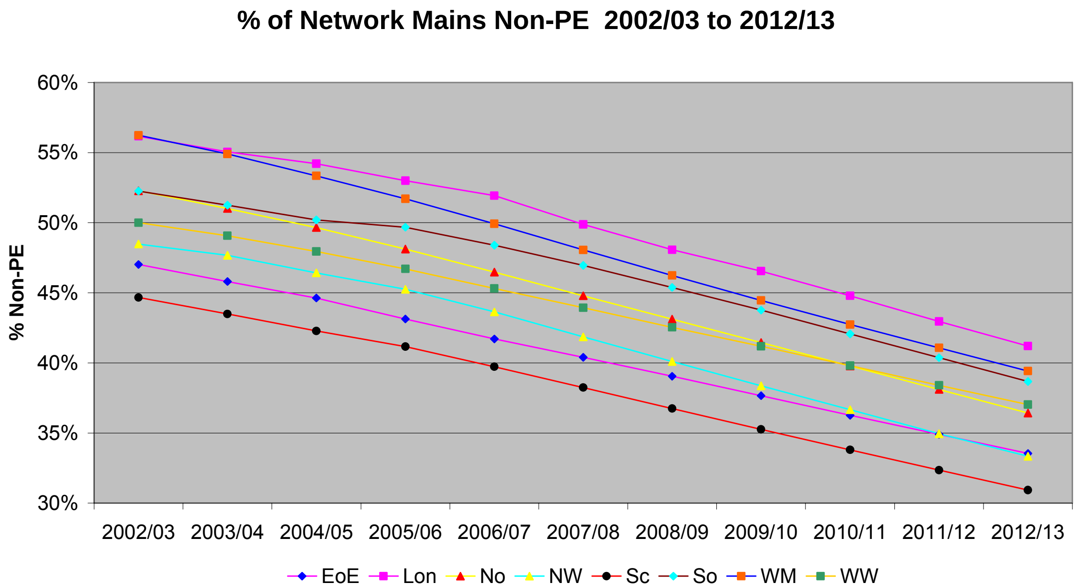

Figure 5-3

The downward trend in condition repairs is achieved despite small increases in average system pressure in response to load growth and the replacement programme where the installation of smaller mains calls for marginally increased pressures[5].

[4] See Section 8 of our report on Capex and Repex

[5] Exceptions are discussed in the relevant report.

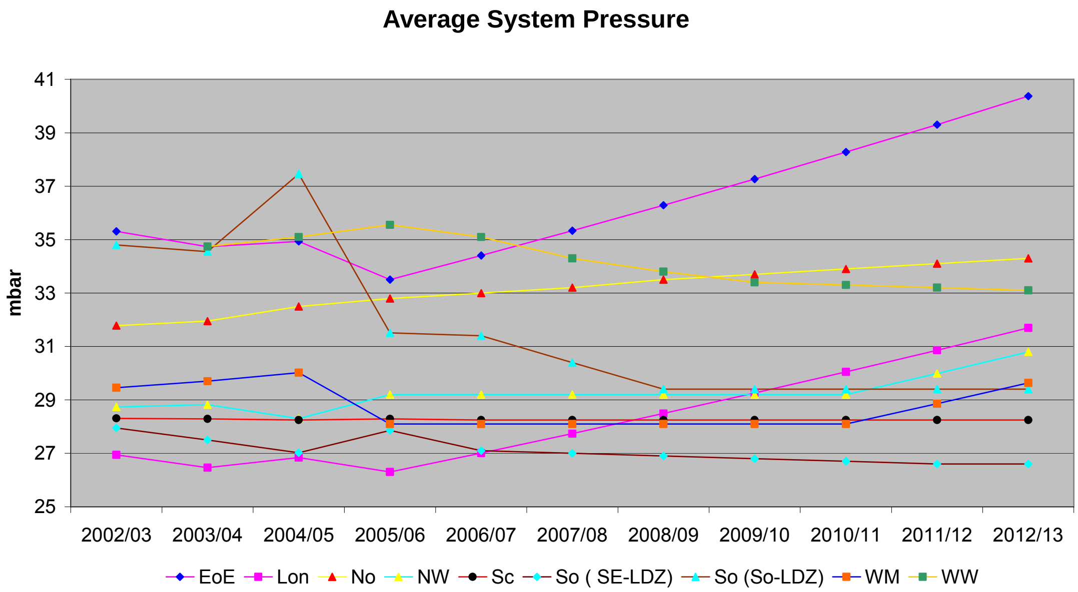

Figure 5-4

Interference Repairs

Interference repairs form about 15% of the repair workload, the majority of repairs being to services which are shallower and have less mechanical strength than mains.

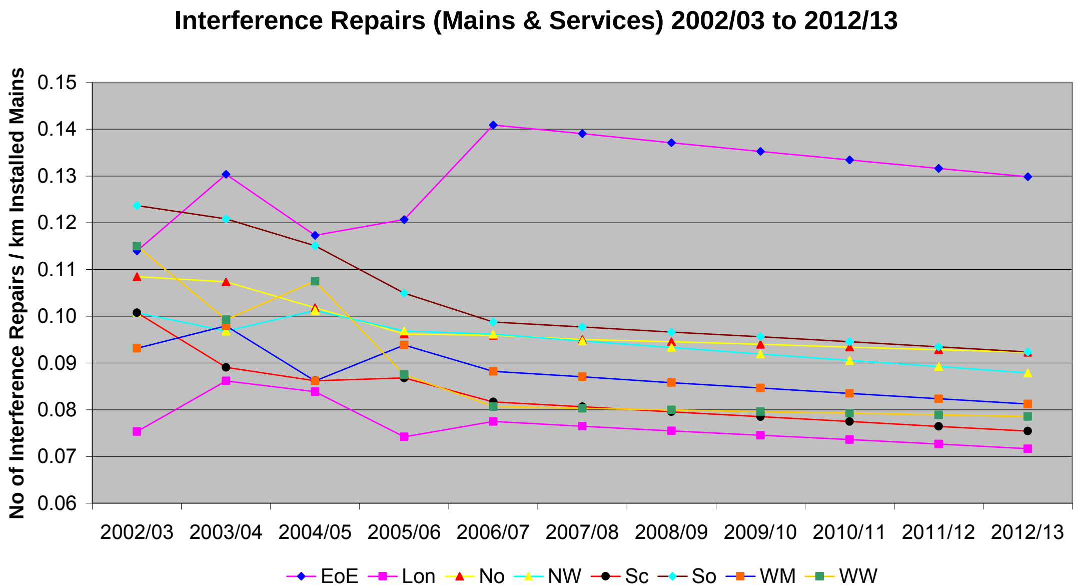

Figure 5-5

A further downward trend can be achieved by communicating with those most likely to cause damage: other utilities and their contractors, highway authorities, builders and developers etc. all of which are required to employ safe systems of work and to identify damage to underground plant as a potential hazard. The accuracy of records supplied and attendance on site will help to maintain a downwards trend[6].

[6] Exceptions are discussed in the relevant report.

5.3.3 APPROACH TO THE ASSESSMENT OF EFFICIENCY

In assessing the efficiency of investment (2005/06 onwards) we have examined the Network's 2005/06 costs and compared these with the seven other Networks taking into account, as far as is possible, differences such as numbers of mains and services repairs, the proportions of direct and contract labour, and regional cost differences as derived from indices published by BCIS (The Building Cost Information Service a subsidiary of the Royal Institution of Chartered Surveyors) and DTI – Annual Survey of Hours and Earnings (ASHE).

We have chosen a regression approach as it avoids the direct comparison of unit costs for different disaggregated cost categories, which we regard as unreliable given differences in cost allocation at a disaggregated level. This enables us to compare the Networks' costs and efficiency on a consistent basis

As discussed in Section 2, the starting point for setting the target benchmark is an Ordinary Least Squares (OLS) regression on the eight data points, one for each GDN, applicable in the base year (2005/06). The regression calculation determines a relationship between the costs and the workload driver. The regression line is shown in black on the graphs. As discussed in Section 2 we have then adjusted the regression line to give the upper quartile regression line which is the target which all under performing GDNs should move towards. This is shown in pink on the charts.

High performing networks will be expected to continue to improve their performance over the period to 2012/13. The resulting target costs for 2012/13 are shown in yellow on the charts.

A number of regression options have been explored in analysing repair costs, including a number of different explanatory variables.

Repairs comprise four main work elements:

- mains condition repairs
- services condition repairs
- mains interference repairs
- services interference repairs.

The workloads for each of these elements have different forecast trends in each of the networks. We have therefore constructed an explanatory variable which is a composite single variable (CSV) based on the proportion of costs attributable to each of these elements in the base year, as the basis for our cost analysis.

$CSV = \sum Un*Vn/1000$

where U is the representational unit costs for the each repair types/pipe size and

V is the corresponding actual volumes.

The same representative unit costs have been used each Network and have been chosen by reference to contract rates for the four repair types; these are shown in the table below.

CSV Calculation (Northern 2005/06)	Volume (Repairs)	Unit Cost (£/Repair)	Total (£000s)
Repairs to Mains (Condition </=3")	1149	554	636
Repairs to Mains (Condition 4-5")	4648	595	2764
Repairs to Mains (Condition 6-7")	2021	688	1390
Repairs to Mains (Condition 8-9")	1003	1130	1134
Repairs to Mains (Condition 10-12")	1025	1130	1158
Repairs to Mains (Condition >12-18")	448	1856	831
Repairs to Mains (Condition >18-24")	87	1889	164
Repairs to Mains (Condition >24")	9	3846	33
Repairs to Mains (Interference)	576	326	188
Repairs to Services (Condition)	10023	250	2506
Repairs to Services (Interference)	2835	202	572
CSV			11374

Table 5-2

5.3.4 ESTABLISH UNDERLYING COSTS

Cost normalisation

Section 2.5.1 gives details of the generic normalisation adjustments which have been carried out. For Repair, the principal normalisation adjustments are outlined below.

- **Cost transfer** – there are no cost transfers associated with Repair
- **GDN reallocation** – the outcome of the reallocation process in which NGN identified the changes to the allocation of costs to reflect our proposed allocation of sub-activities[7].
- **Accounting adjustments** – which have been provided by Ofgem
- **Pensions adjustments** – these adjustments are the net adjustments between NGN's reported pension costs and the standard pension costs used by PB Power
- **Removed costs** – there are no removed costs associated with Repair.

The detail of the adjustments to the BPQ costs submitted by the Network is given in the following table.

Normalisation Adjustments	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Cost transfer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GDN reallocation	0.0	0.3	0.2	0.3	0.3	0.2	0.2	0.3	1.9
Ofgem Accounting Adjustments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pension Adjustments	0.1	-0.3	-0.4	-0.5	-0.4	-0.4	-0.4	-0.5	-2.8
Removed costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**0.1**	**0.1**	**-0.1**	**-0.2**	**-0.2**	**-0.2**	**-0.2**	**-0.2**	**-0.9**

Table 5-3

[7] Full details of the GDN reallocation are given in Appendix 6

Historical costs

The table below shows a split of repair costs by expense type over the three years 2004/05 – 2006/07.

Expenditure Breakdown £ m 2005/06 Prices	2004/05	2005/06	2006/07
Contract	10.8	4.1	3.3
Direct	0.0	4.8	6.1
Materials	0.0	0.6	1.0
Other	-0.4	1.0	0.9
Gross Cost	10.4	10.5	11.3
Income	0.0	-0.7	-0.9
Net Cost	10.4	9.8	10.4

Table 5-4

An overall decline in workload in 2005/06 (Figure 5-1) was accompanied by a corresponding decline in cost. In 2006/07 cost is forecast to rise a little more than workload but the cost/workload relationship is influenced by the work mix, in particular the diameter of mains repaired and their location in verge, footway or carriageway. The cost of the Repair activity can also be influenced by peaks in workload and subsequent deferral of repairs. This enables the Network to re-schedule the work required to complete repairs but means that they incur monitoring costs in the interim.

5.3.5 TABLE OF ADJUSTMENTS TO THE BASE YEAR (2005/06)

We have carefully examined the base year volumes and costs since it is this year that establishes the relative position of the Network and the potential efficiency savings available.

Base Year (2005/06) Assumptions and Adjustments

Repairs Volumes (2005/06)	BPQ Submission
Repairs to mains (condition)	10389.5
Repairs to mains (interference)	576
Repairs to services (condition)	10023
Repairs to services (interference)	2835
Total	23823.5

Table 5-5

The number of repairs recorded (Figure 5-1) was slightly less than in the two preceding years but we have made no adjustment to 2005/06 volumes.

Base Year (2005/06) Assumptions and Adjustments

Expense Categories £m	BPQ	Normalised
Contract	4.1	4.1
Direct	4.8	5.4
Materials	0.6	0.6
Other	1.0	0.5
Gross Cost	10.5	10.6
Income	-0.7	-0.7
Net Cost	9.8	9.9

Table 5-6

Normalisation adjustments are detailed in Table 5-3 above.

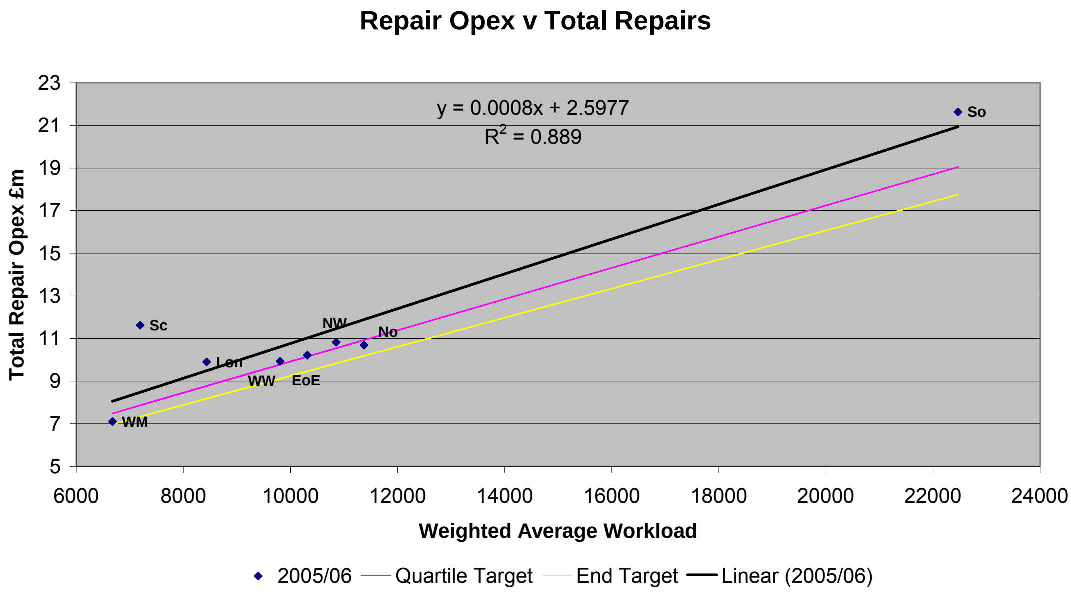

Figure 5-6

In the chart above (2005/06) Northern is ahead of the upper quartile and is the second most efficient Network.

5.4 FORECAST

5.4.1 INTRODUCTION

We have reviewed the process used by the Network to generate its forecast. We found that the Network takes into consideration relevant factors that influence the forecast; the change in population (and thus repairs) arising from its mains and services replacement programmes and ageing of the remaining population, the effect of gas conditioning, the effect of pressure management systems, average system pressure and the overall level of emissions from the network.

Overall we found the Network's forecasting process to be reasonable but we have made some adjustments after reviewing the Network's assumptions.

5.4.2 NETWORK PROPOSALS

The Network forecast is generated in four work categories – mains and services; condition and interference repairs.

Workload Assumptions

The Network has made the following assumptions on external PREs which are the main driver for the Repair workload.

Mains replacement programme will reduce external PREs by	3.3% per annum
The ageing of the system will increase external PREs by	1.8% per annum
Leakage reduction initiatives will reduce external PREs by	0.7% per annum
Overall impact is to reduce external PREs by	2.2% per annum

The Network is anticipating that average system pressures will increase over the plan period.

Costs Assumptions

Company workload and cost trend lines as proposed by GDN for 2006/07 to 2012/13

GDN Proposed Volumes	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Repairs to mains (condition)	9873	9864	9605	9352	9106	8866	8633
Repairs to mains (interference)	573	570	567	564	561	558	555
Repairs to services (condition)	10666	10442	10124	9818	9520	9231	8948
Repairs to services (interference)	2829	2801	2788	2771	2754	2737	2720
Total	23941	23677	23084	22505	21941	21392	20856

Table 5-7

GDN cost projections 2006/07 – 2012/13

GDN Proposals £ m 2005/06 Prices	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Contract	3.3	2.7	2.8	2.9	2.9	3.0	3.0
Direct	6.1	6.1	6.3	6.5	6.6	6.7	6.9
Materials	1.0	1.2	1.3	1.3	1.3	1.3	1.3
Other	0.9	1.0	1.0	1.0	1.0	1.0	1.0
Gross Cost	11.3	11.0	11.4	11.7	11.8	12.0	12.2
Income	-0.9	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8
Net Cost	10.4	10.2	10.6	10.9	11.0	11.2	11.4

Table 5-8

5.4.3 PB POWER PROJECTIONS

Proposed Workloads

Condition Repairs

We have carefully considered the likely level of condition repairs and compared this with other Networks, taking into account influencing factors such as the mains population, forecast average system pressure and emissions.

The Network's forecast is that condition repairs will fall by approximately 2.6% per year (mains) and 3% per year (services). The effect of the mains replacement programme is that approximately 4.0% of the metallic network will be de-commissioned each year. Taking into account that all components of the network are ageing, that some condition repairs are to the PE part of the network, and a modest increase in average system pressure, we have assumed a 3% year on year reduction in condition repairs to both mains and services.

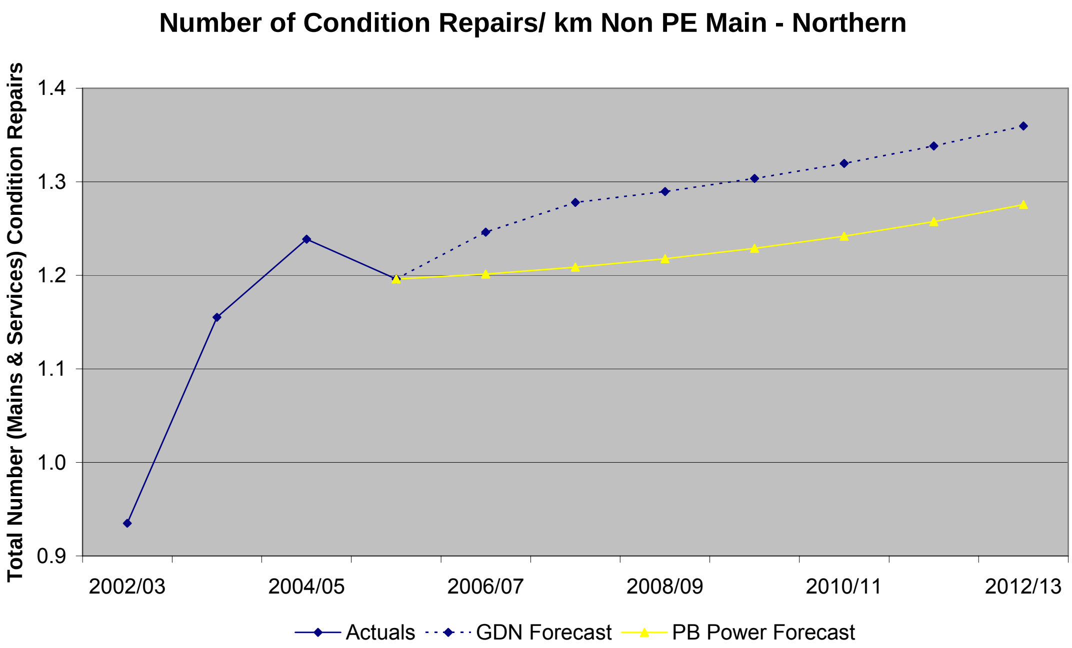

Figure 5-7

Interference Repairs

The Network has forecast a reduction in interference repairs to mains and services of 1.0% per year.

Interference repairs are driven by the amount of construction activity within the Network, but this can be influenced through improved and focussed communication with those undertaking the work. We think a 1.0% per annum improvement to mains and services repairs is realistic and achievable and we accept the Network's forecast.

Adjusted GDN volumes 2006/07 – 2012/13

PB Power Forecast Repair Volumes	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Repairs to mains (condition)	10078	9775	9482	9198	8922	8654	8395
Repairs to mains (interference)	573	570	567	564	561	558	555
Repairs to services (condition)	9722	9431	9148	8873	8607	8349	8098
Repairs to services (interference)	2829	2801	2788	2771	2754	2737	2720
Total	23202	22577	21985	21406	20844	20298	19768

Table 5-9

Proposed Costs

In section 5.3.3 above we explained how we established the relative position of each Network, the upper quartile and the Network with the lowest unit costs overall.

We expect Networks behind the upper quartile to improve and close the gap and we have set the Network the target of closing 70% of the cost gap to the upper quartile over the five years to 2012/13.

Networks that are underperforming relative to the benchmark will be expected to catch up with benchmark costs over the period and achieve some ongoing improvement. Networks that are outperforming are assumed to get an initial reward for outperformance but will be expected to achieve ongoing improvement over time. We have assumed a 1% per annum ongoing efficiency improvement.

On-going efficiency improvements

As part of our review we have considered how these efficiencies may be achieved.

The Network is able to influence the workload through measures such as improved pressure management and gas conditioning. The repair process itself is complex and labour intensive and productivity improvements are likely to be achieved by a chain of small initiatives.

We are aware of Network initiatives for:

Supervisor Support - to allow supervisors to drive performance improvements; taking away the excuses; removing administrative burden; providing instant support; allowing first line supervisors to spend at least 80%of time in the field, managing teams.

Training - to ensure that front line staff are adequately trained to do the job; toolkit training focused on soft skills; policy and procedure training.

Unlocking the benefits - to create a new way of working; applying new skills and utilising new support team and monitoring tools; effective use of time; report interpretation; action planning and review meetings.

Performance Monitor - to create an improved and effective performance monitoring tool to cover: productivity and performance; finance (cost of carrying out work); HS&E (Working in a safe environment); customer (meeting customer expectations).

We believe that through a programme of continuous improvement our recommended expenditure is achievable.

5.4.4 SPECIFIC COST AREAS

Gas Safety (Management) Regulations - Re-programming Repair Work.

We have assumed that there is no change to the Network's practice (2005/06) on re-programming repair work.

Impact of Waste Management Regulations - Landfill Directive & Landfill Tax

The Network will be exposed to cost increases arising directly from the Landfill Regulations and Landfill Taxes. It will also incur other costs to optimise overall expenditure in this area and minimise waste to landfill.

Improved waste segregation will be required to prevent more of its waste being classified under the Landfill Regulations as “non-hazardous” rather than “inert” as at present. The shift from inert to non-hazardous status is primarily driven by the volume of bituminous materials to be disposed of, either directly, or where inert material has become contaminated with bituminous material making the whole of the contaminated waste non-hazardous and subject to higher disposal charges. In addition, the Environment Agency is becoming more active in enforcing the Landfill Regulations and Landfill Operators are becoming more cautious in accepting material as “inert”, causing it to be disposed of as “non-hazardous” at higher cost.

As well as disposal charges, the Landfill Tax charge is currently levied at £2/tonne for inert/inactive waste, with a standard rate of £21/tonne charged for all other waste. The Government has stated that the standard rate for non-hazardous waste will increase by at least £3[8] annually to a rate of £35 in 2010.

The Network has not included these higher tax costs, or the associated costs related to the improved segregation of materials and increases in tipping charges, within its forecast

There is considerable uncertainty around the likely change in disposal and tax charges going forward. Variables are:

- The volume of waste and the proportion of inert and non-hazardous (and small volumes of hazardous) material for disposal.

[8] Revised to £8 each year to 2011 in the recent Budget statement.

- The marginal costs of waste segregation and the level, and cost, of recycling achieved.
- The cost of testing to establish the status of waste for disposal.
- The rate of Landfill Tax due on the waste for disposal.

The Landfill Tax charge in our base year was £18/tonne (Standard Rate) and our analysis has made no specific allowance for the proposed increases in subsequent years. Nor has any allowance been made for possible changes in the enforcement of the Landfill Regulations.

We therefore recommend that this is treated as an uncertain cost and that an adjustment is made following further assessment.

5.4.5 REAL PRICE EFFECTS

We consider that real growth in wages and contractor rates will be lower than GDN assumptions. We have assumed RPI +2.25% (contractors) and RPI + 1% (direct labour and materials) each year. This has to be considered in conjunction with our overall productivity assumption for Repair of a 1% year on year gain, making our view more optimistic overall.

5.4.6 RECOMMENDATIONS

The proposed adjustments are shown in the following table.

Controllable Opex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13
GDN BPQ Submission (Gross)	11.4	11.7	11.8	12.0	12.2
Normalised Adjustments	-0.2	-0.2	-0.2	-0.2	-0.2
Normalised Submission (Gross)	11.2	11.5	11.6	11.8	12.0
Regression Driver	10435	10140	9854	9576	9306
Benchmark Performance	9.9	9.6	9.3	9.0	8.8
Baseline Performance	9.7	9.4	9.1	8.9	8.6
Gap	-0.2	-0.2	-0.2	-0.2	-0.2
Convergence	-0.1	-0.1	-0.1	-0.2	-0.2
Recommended (Ex RF & RPE)	9.8	9.5	9.2	8.9	8.6
Recommended (Inc RF & RPE)	10.2	10.0	9.8	9.7	9.5
Allowed Adjustments	0.0	0.0	0.0	0.0	0.0
Proposed Gross	10.2	10.0	9.8	9.7	9.5
Proposed Income	-0.7	-0.7	-0.7	-0.7	-0.7
Proposed Net	9.5	9.3	9.1	8.9	8.7

Table 5-10

Recommended Efficient Expenditure

Proposed £m	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Actioned Repairs to mains (condition)	7.2	7.1	6.9	6.8	6.7	34.8
Actioned Repairs to services (condition)	2.2	2.2	2.1	2.1	2.1	10.7
Actioned Repairs to mains (interference)	0.2	0.2	0.2	0.2	0.2	0.9
Actioned Repairs to services (interference)	0.5	0.6	0.6	0.6	0.6	2.8
Gross Total	10.2	10.0	9.8	9.7	9.5	49.2
Income	-0.7	-0.7	-0.7	-0.7	-0.7	-3.7
Net Total	9.5	9.3	9.1	8.9	8.7	45.5

Table 5-11

This table shows the costs reported by the Network in their BPQ submission and these costs adjusted by our normalisation process.

It then shows the build-up of our recommended costs as follows:

- The values of the workload driver over the period 2008/09 to 2012/13 and the benchmark unit costs which are multiplied to give the Benchmark performance. The Benchmark unit costs include PB Power's expected productivity improvements.
- Baseline performance: This is the Network's BPQ reported performance in the base year tracked forward to 2012/13 taking account of PB Power's expected productivity improvements.
- The Gap, which is the difference between the Baseline performance and the Benchmark performance.
- Convergence: The convergence adjustment provides a glide path of cost to the 2012/13 Baseline performance.
- The sum of the Benchmark performance and the convergence gives the Recommended (Ex RF and RPE) cost.
- These costs are then adjusted for our Regional Factors (RF) and our Real Price Effects (RPE)
- The allowed adjustments for specific cost areas are then added to give the Recommend cost (Inc RPE).

The comparison between the normalised BPQ forecast, the target and recommended expenditure is shown in the following figure:

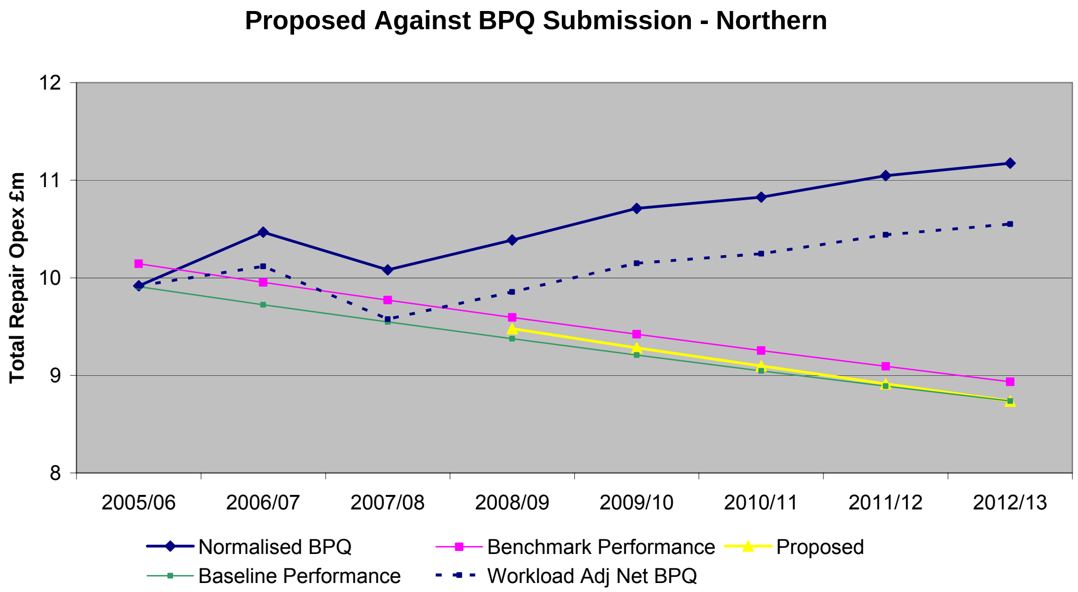

Figure 5-8

Note: the Benchmark and Baseline Performance lines include Adjustments

6 MAINTENANCE

6.1 SUMMARY

Controllable Opex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission	12.7	12.8	12.9	13.2	13.4	**65.0**
Normalisation Adjustments	-1.7	-1.7	-1.7	-1.7	-1.7	**-8.5**
Normalised BPQ	11.0	11.1	11.2	11.5	11.7	**56.5**
Adjustments	1.7	1.1	0.6	-0.2	-1.0	**2.1**
Proposed	12.7	12.2	11.7	11.3	10.8	**58.6**

Table 6-1

6.2 POLICIES & PROCEDURES

6.2.1 INTRODUCTION

NGN has a clear route of governance by which policies and procedures are formed, approved, and implemented. They have a Policy Framework Review Panel which identifies the need for new or reviewed documents brought about by legislation, regulations or internal Company requirements. Appendix 1 reviews the financial and technical framework under which NGN operates, the structure they utilise to manage their assets effectively and the key policies they adopt to ensure they meet their statutory and licence obligations and other regulatory requirements.

This section reviews the various statements made by NGN in support of their planning and decision making processes which drive their maintenance expenditure.

Maintenance covers:

- LTS maintenance
- Storage
- Maintenance Other

Governance of policies and procedures for these activities must ensure the safe and efficient operation of plant, and safe and efficient maintenance tasks undertaken upon them, by network staff, and service providers.

6.2.2 SCOPE OF POLICES AND PROCEDURES

At the time of purchase of the Network, NGN inherited complete suite of policies and procedures from National Grid and believed these to be satisfactory. Most of these policies and procedures, and these, with minor editing to acknowledge the ownership change, remain in use. We have found no evidence that policies and procedures have either been abandoned, or relaxed in a significant way, leading to our conclusion that, from the evidence provided in BPQ responses, the scope of policies and procedures in use, continue to be both satisfactory, and complete.

6.2.3 REVIEW AND UPDATE PROCESS

NGN's Policy Framework Review Panel may consist of NGN personnel, service provider personnel and external specialists and/or consultants. The Panel manages the production of draft documents, to be reviewed by a peer group, before being submitted to the Gas Network Special Engineering Committee (GNSEC), for approval and/or implementation. Governance responsibility for all documents is held by NGN. When new documents are approved, briefings and/or detailed training is given to those affected.

The review and update procedure is discussed further in Appendix 1.

6.2.4 EFFICIENCY AND PRODUCTIVITY

We have not carried out detailed audits of the degree of compliance within the Network, to the stated policies and procedures. However, within the maintenance category, we can say, that from the evidence offered within the BPQ responses, there are no indications that they are not being followed. There is no evidence of systematic failures of equipment, which could indicate lack of compliance. Similarly, within safety related statistics, such as lost time accidents, there is not evidence of unsafe practices being employed, which could be used as an indicator of the lack of compliance with documented policies and procedures.

NGN have implemented a business model, which out sources work delivery to an independent service provider, whilst retaining Asset Management and Maintenance strategic policies and workload setting within NGN.

We recommend that the policies and procedures are viewed as a satisfactory basis for forecasting expenditure projections.

6.3 HISTORIC PERFORMANCE

6.3.1 INTRODUCTION

We would expect to test historic cost performance against workload data drawn from the company's management information system. This historical performance data could be helpful in developing trends of workload, costs, and unit costs, which could be then used as comparisons year to year, and also to make comparisons with other GDNs performance.

We understand that for this activity, historical management and cost information, pre 2005/06 is not readily available and may be inconsistent with post network sales data, and therefore of little value in deriving historical trends.

The historical initiatives and factors influencing forecast costs are the following:

Labour

The use of contract or direct labour on the activities of maintenance influences the costs. We understand that the majority of work undertaken for NGN in this area is through their principle service provider UUOL, with a small exposure to specialist contractors for some communications, instrumentation and electrical maintenance.

Some of the activities within this activity involve surveys, or collection of readings, NGN report that the cross-skilling of staff, and the introduction of `single person working`, are playing a part in minimising costs, and maximising productivity, by utilising what would otherwise be unproductive time, for example by using Emergency FCOs, for such work.

Asset legacy

NGN report that some equipment used within the pressure control and instrumentation activities is such dated technology, that maintenance is becoming difficult and costly, because the skilled resources and spares items are either unavailable, or available at high cost. We have also noted that NGN report the high cost of retaining some pressure control schemes, as the technology used requires the full time use of dedicated telephone land-lines.

NGN report that there are variances in designs and types of equipment with a similar duty, across and within the two original LDZ areas. As equipment is being replaced, the opportunity is being taken to standardise, thus improving the effectiveness of purchasing contracts, logistics, and staff training.

6.3.2 DEFINITION OF ACTIVITY

Maintenance covers 3 areas:

LTS maintenance comprising the following main activities

- Cathodic Protection
- Pipeline monitoring
- Repairs – investigations and repairs arising from the pipeline monitoring
- Aerial surveys - Each pipeline is over flown by helicopter every two weeks
- TD1 surveys. Each pipeline is surveyed every four years.
- AGI maintenance
- AGI painting

Storage comprising the following main activities

- LP holder routine inspections and maintenance
- LP holder Non Routine Maintenance (NRM) which includes holder painting and repairs and work to meet legislative and regulatory changes
- HP bullet routine maintenance, inspections and painting.

Maintenance Other comprising the following main activities:

- Other Leakage Control e.g. mains surveys, gas conditioning, pressure profiling
- Distribution Mains and Services – mains and service repair and maintenance
- Instrumentation – repair and maintenance
- District Governors

6.3.3 ESTABLISH UNDERLYING COSTS

Cost normalisation

Section 2.5.1 gives details of the generic normalisation adjustments which have been carried out. For each type of Maintenance activity, the principal normalisation adjustments are outlined below.

- **Cost transfer** – the only transfer involves Storage where costs for holder handrail work have been transferred from Capex
- **GDN reallocation** – the outcome of reallocation process in which NGN identified the changes to the allocation of costs to reflect our proposed allocation of sub-activities9.
- **Accounting adjustments** – which have been provided by Ofgem
- **Pensions adjustments** – these adjustments are the net adjustments between NGN's reported pension costs and the standard pension costs used by PB Power
- **Removed costs** – in each of the 3 maintenance activities, special costs have been removed prior to the comparative analysis, details of these are provided within the specific sections on each activity.

The detail of the adjustments to the BPQ costs submitted by NGN for Northern's network is given in the following tables.

[9] Full details of the GDN reallocation are given in Appendix 6

LTS maintenance

Normalisation Adjustments	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Cost transfer	-1.1	-1.5	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-11.0
NSA transfer to Work Management	-1.1	-1.5	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	
GDN reallocation	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	3.0
Ofgem Accounting Adjustments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pension Adjustments	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.114
Removed costs	-0.2	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	-0.6
Wetherall to Catton repairs	-0.2	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	
Total	**-0.9**	**-1.3**	**-1.2**	**-1.0**	**-1.0**	**-1.0**	**-1.0**	**-1.0**	**-8.7**

Table 6-2

Storage maintenance

Normalisation Adjustments	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Cost transfer	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.8
Holder handrails transfer from Capex	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	
GDN reallocation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Ofgem Accounting Adjustments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pension Adjustments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
Removed costs	-0.3	-1.1	-1.1	-1.1	-1.0	-1.0	-1.0	-1.0	-7.6
Holder handrails	0.0	0.0	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	
Holder painting	0.0	-0.8	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	
Salt cavity rental	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	
Total	**-0.3**	**-1.0**	**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-6.6**

Table 6-3

Maintenance Other

Normalisation Adjustments	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Cost transfer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GDN reallocation	0.0	0.3	0.2	0.2	0.2	0.2	0.2	0.2	1.6
Ofgem Accounting Adjustments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pension Adjustments	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.2
Removed costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**0.0**	**0.1**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**1.4**

Table 6-4

In this section, all the costs analysed are on a normalised basis as described above, however where we are presenting GDN reported costs, the removed cost adjustment, which is made for analysis purposes, has not been included.

2005/06 and 2006/07 costs

Consideration of the Network expenditures for 2005/06 and 2006/07 for each of the maintenance activities shows increases in Storage for holder painting and decreases in

Maintenance Other due to changes in connection income and costs and the phasing of DSEAR[10] costs.

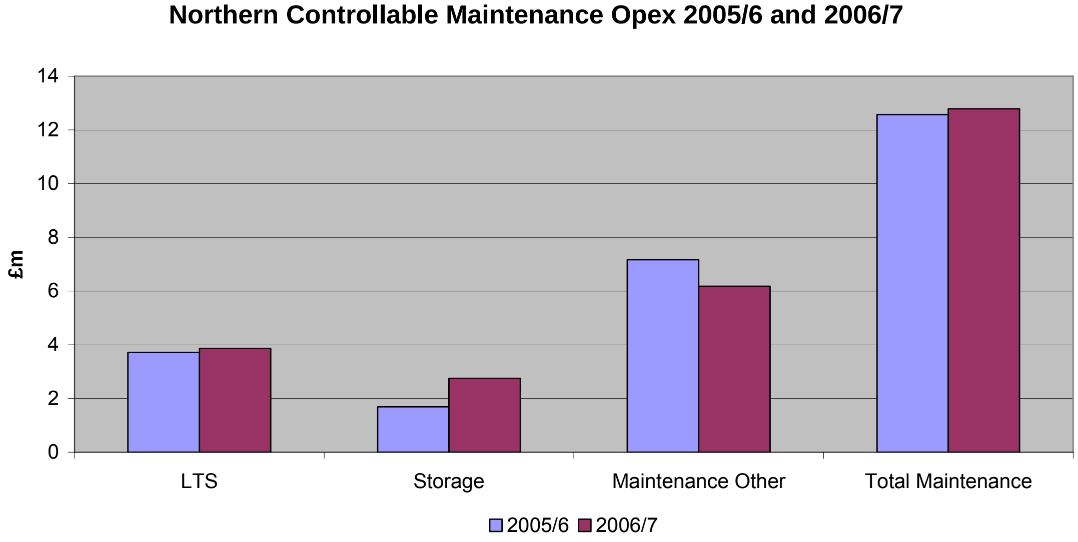

Figure 6-1

We have compared Northern's unit costs for the three maintenance activities against the average unit costs across all GDNs (see chart below). We believe that costs of the different maintenance activities are driven by different workload drivers:

- LTS: Number of PRSs
- Storage: number of holders – volume of holders is also used in the analysis.
- Maintenance Other: different drivers apply to each of the main sub-activities. For the purposes of a high level comparison of unit costs here, the length of < 7bar main is used.

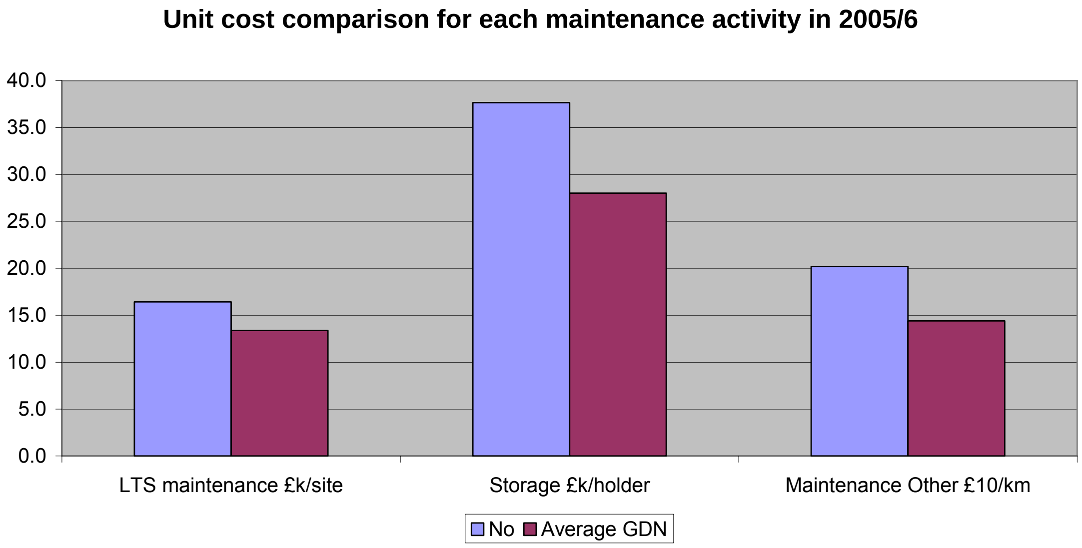

Figure 6-2

[10] The Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) includes surveys and where necessary remediation of above 7 bar and below 7 bar installations.

The chart shows that for all three activities Northern has higher unit costs than the average of the GDNs.

The selection of these drivers is discussed in more detail below. For the main analysis set out below, the driver of Maintenance Other costs is modified to include specific drivers of cost for each of the three main categories of maintenance included under that heading.

The proposed efficient levels of unit costs are developed below.

6.3.4 PROPOSE EFFICIENT LEVEL OF COSTS

The volume of assets covered by Northern's maintenance activities had remained broadly flat through the period 2002/03 to 2005/06, as shown in the table below.

Maintenance activity	Main workload driver	Volume of assets 2002/03	Volume of assets 2005/06	% change
LTS maintenance	No of Sites	245	226	-7.76%
Storage	No. of holders	46	45	-2.17%
Maintenance Other	km of < 7 bar main	35448	35476	0.08%

Table 6-5

It is assumed that reductions in the required maintenance of newly installed capital and replacement assets will be offset by the ageing population of remaining assets, and their associated levels of maintenance.

We have not been provided with a breakdown of direct activity costs to maintenance activities for the years prior to 2005/06. The 2005/06 costs therefore provide a baseline for developing our cost projections.

6.4 FORECAST

6.4.1 INTRODUCTION

Analysing maintenance costs projections provided by all GDNs shows rising unit costs for LTS and storage maintenance from 2005/06 to 2012/13 (over 70% increases in unit costs for LTS and over 100% for storage), and smaller increases in unit costs for Maintenance Other (around 10% over the period).

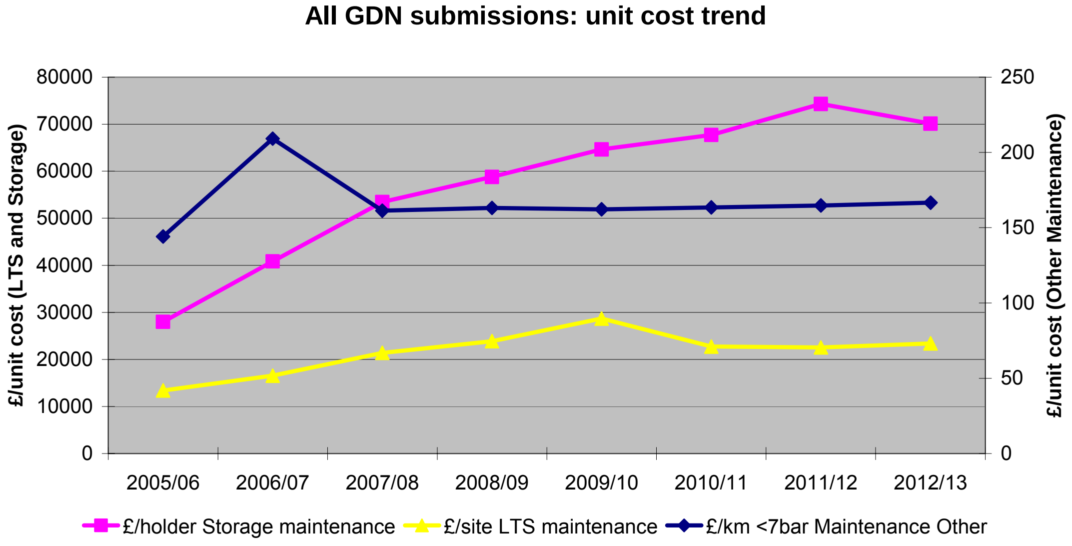

Figure 6-3

The rising costs for storage maintenance through to 2011/12 reflect holder painting programmes and the cost associated with the working at heights regulations with a fall in 2012/13 as these costs reduce.

6.4.2 COMPANY PROPOSALS

Northern shows trends in unit costs which are increasing over the period from 2008/09 to 2012/13, similar to the pattern across all GDNs, but marked increases in Maintenance Other.

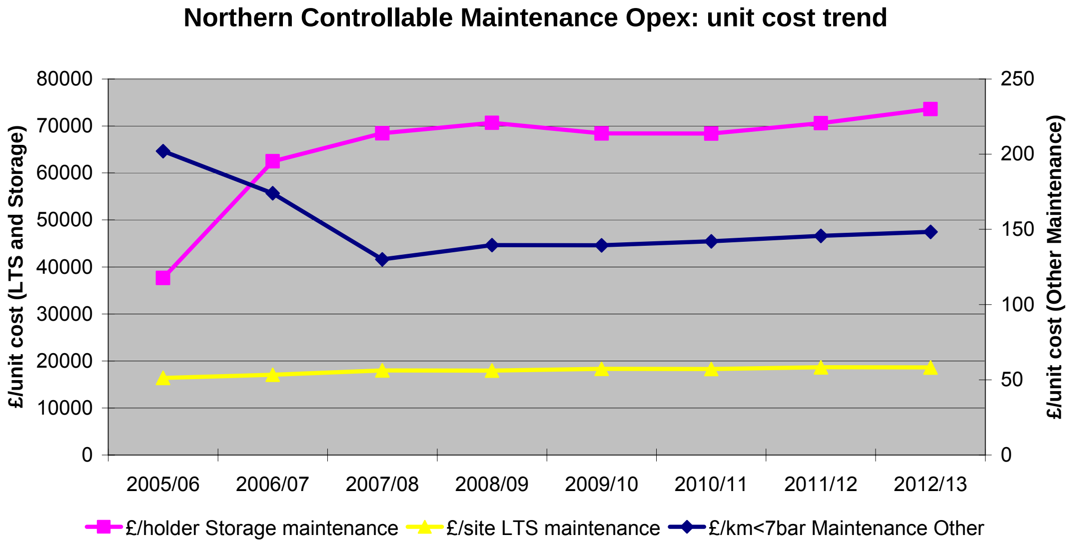

Figure 6-4

6.4.3 PROPOSED PROJECTIONS

Section 2 sets out the approach we use to set benchmark costs. The following techniques are used:

- Bottom-up analysis.
- Regression analysis
- Unit cost analysis

To use these techniques we need to establish a cost driver or explanatory variable.

The proposed maintenance costs are developed for LTS, Storage and Maintenance Other in turn[11].

6.4.3.1 LTS maintenance

Definition of activity

The maintenance activities covered by this activity include:

- Cathodic Protection
- Pipeline monitoring
- Aerial and vantage point surveys
- TD1 surveys
- Marker post maintenance
- AGI routine maintenance and repairs
- AGI painting

Underlying costs

The volume of maintenance activities are related to the length of network and the number of AGIs. The chart below shows that in 2005/06 Northern has a higher proportion of 300 mm diameter (and smaller diameter) pipelines and a smaller proportion of large diameter pipelines than the average GDNs, and against this criteria should have unit costs below average. In 2005/06 Northern had 226 PRSs (including NTS offtakes).

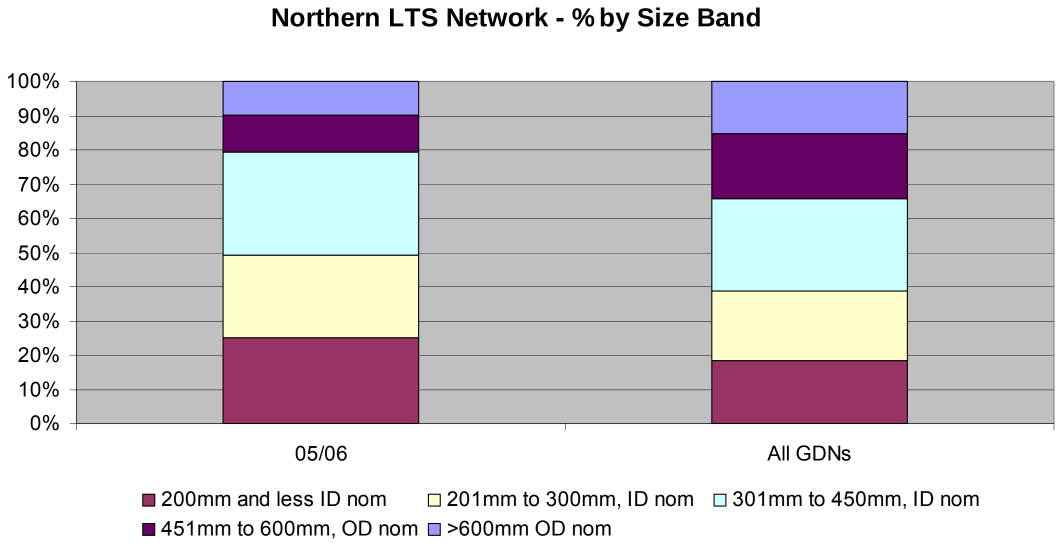

Figure 6-5

[11] Additional information, which became available during March 2007, led to a review of the supporting analysis. At the time of this report, insufficient detail was available to fully evaluate any potential impact from this new information.

The following figure shows that Northern's costs are forecast to increase over the period to 2012/13.

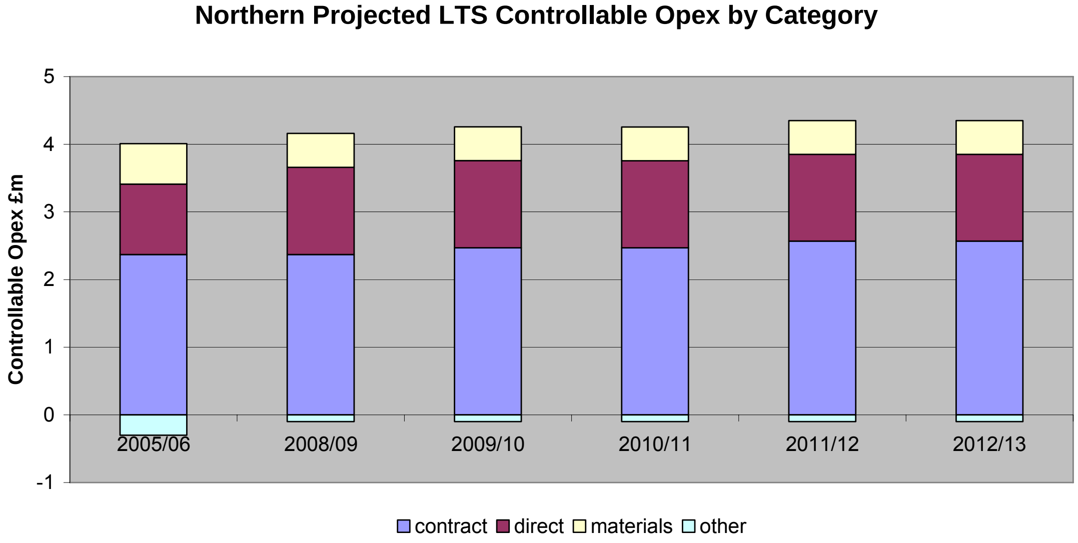

Figure 6-6

Bottom-up analysis

Some 298km (25% of the Network's LTS pipelines) are of diameters 200mm and below (see chart below). In the main, these pipelines are non-piggable (ie not capable of internal On-Line Inspection (OLI)) due to their diameter. Other reasons why internal OLI cannot be used is because of design, spurs into AGIs and gas operating constraints.

In total 251km (21%) of Northern's pipelines are non-piggable.

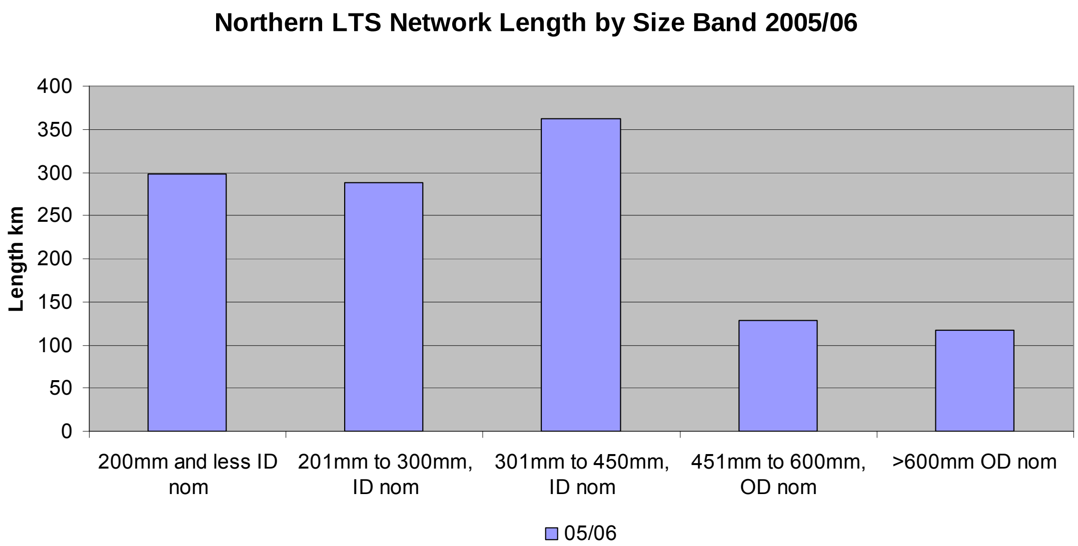

Figure 6-7

In 2005/6, the average GDN carried out five OLI runs.

Whilst some pipeline maintenance costs (eg OLI runs, repair costs) are diameter related, other costs (eg TD1 surveys, marker post maintenance) are largely independent of pipeline diameter, and therefore our proposals are developed assuming the average pipeline diameter mix across all GDNs. Also, as discussed below, the majority of LTS maintenance costs relate to PRS assets.

The benchmark maintenance costs were initially assessed by consideration of the replacement asset value of the LTS pipeline network to derive an indicative maintenance cost.

The total replacement cost of all 8 GDN LTS networks was estimated based on notional average unit costs (£0.6m/km for pipelines and £2m per PRS). These costs have been derived using the LTS pipeline unit costs reported in our Capex reports Appendix 6. The PRS cost is an average cost across LTS PRSs and NTS offtakes, with LTS PRSs estimated to comprise two thirds of the relevant total asset value and therefore of the associated annual maintenance cost and NTS offtakes one third.

Applying our estimated maintenance cost percentages for pipelines and PRSs, gives an annual total maintenance cost across all GDN of £20m per annum, equating approximately to the total LTS maintenance cost across all GDNs.

2005/06	All GDNs	All GDNs (Notional replacement values)	Assumed annual maintenance cost as % of asset value (All GDNs)	Estimated LTS maintenance cost per year (All GDNs)
Pipeline assets	11712km	£7000m	0.05%	£3.5m
PRS assets	1656 PRSs	£3300m	0.50%	£16.5m
Total		£10300m		£20.0m
No. of PRSs				1656
Cost per PRS				£12000/PRS

Table 6-6

Allocating this to GDNs by number of PRSs gives a cost for Northern with 226 PRSs of £2.7m pa.

The above approach is only indicative since it uses no information on maintenance activities at the local level or individual years but does provide a general guide to further analysis, particularly in comparative analysis between GDNs.

Northern's BPQ submission (normalised) for LTS maintenance amounts to £3.7m in 2005/06 compared to the figure derived above of £2.7m.

We have analysed the relationship between LTS maintenance costs and length of network and between LTS maintenance costs and number of PRSs. Our view is that the dominant cost driver is the number of PRSs.

<u>Comparison with NTS costs</u>

The NTS transports gas over greater distances than the LTS and therefore for the NTS length is a more appropriate cost driver than the number of AGIs.

The TPA report[12] prepared for the transmission price control review concluded that the efficient level of maintenance costs for the NTS was £552/km (2004/05 prices - £566/km at 2005/06 prices).

The NTS has 6877km of pipeline and 278 AGIs/PRSs (or 1 AGI per 25km). The total length of the LTS across all GDNs 11712km and includes 1656 PRSs (or 1 PRS per 7km), and the BPQ submissions amount to £20m across all GDNs which gives a unit cost of £1708/km. This is approximately three times the unit costs for the NTS shown above.

However, we do not believe that the unit cost per km measure is an appropriate measure for comparing the maintenance cost of the NTS and LTS networks. This is because AGIs/PRSs are 3.6 times more frequent per km on the LTS than are AGIs on the NTS, and AGIs/PRSs consume the majority of maintenance expenditure. Also, some higher costs are incurred with

12 Transmission Price Control Review 2007-2011, Efficiency Study and Forecast Opex, 29th September 2006, TPA Solutions, published by Ofgem

the smaller lengths of pipeline generally in the LTS networks. These smaller lengths increase total setup costs for some activities such as pigging.

We have therefore used the information in Table 6-6 to determine costs which can be compared to NTS costs.

The assumption from Table 6-6 is that the maintenance costs associated with the pipelines themselves account for 18% of LTS maintenance costs and that 82% of LTS maintenance costs are associated with AGIs/PRSs. Evidence from GDNs suggests that the proportion of cost associated with pipelines is around 20% of costs.

We have applied the costs shown in Table 6-6 pro-rata to length and number of AGIs respectively to the NTS as shown in the following table.

Maintenance cost pa	LTS	NTS
Pipelines	11712	6877
AGIs/PRSs	1656	278
LTS pipeline cost	£3.5m	
Pro rata NTS pipeline cost		£2.1m
LTS AGIs/PRSs cost	£16.5m	
Pro rata NTS cost		£2.8m
Total	£20.0m	£4.9m

Table 6-7

This gives an annual maintenance cost for the NTS of £4.9m or £712 per km.

This unit cost is somewhat higher than the £566/km obtained elsewhere for the NTS but the difference could be due to the PRSs attached to the LTS being more complex in maintenance terms than the AGIs associated with the NTS, which often do not have pressure reduction equipment. We also believe that the £566/km figure does not include cathodic protection maintenance and remediation costs (about £100/km). We therefore consider that the unit cost obtained above for LTS maintenance (£12,000 per PRS) is reasonable and generally consistent with the maintenance costs for the NTS.

Unit cost analysis

We have examined the possible relationships between LTS maintenance costs as reported by the GDNs against a number of cost drivers and concluded that regression analysis does not give robust results.

We have therefore examined unit costs between the network expressed in terms of £ per PRS. As part of this process significant repair costs incurred were removed. Northern incurred repair costs in 2005/06 of £0.4m related to the Catton to Wetheral pipeline. We have removed half of this cost as being atypical.

The following figure shows the unit costs for 2005/06 for all GDNs.

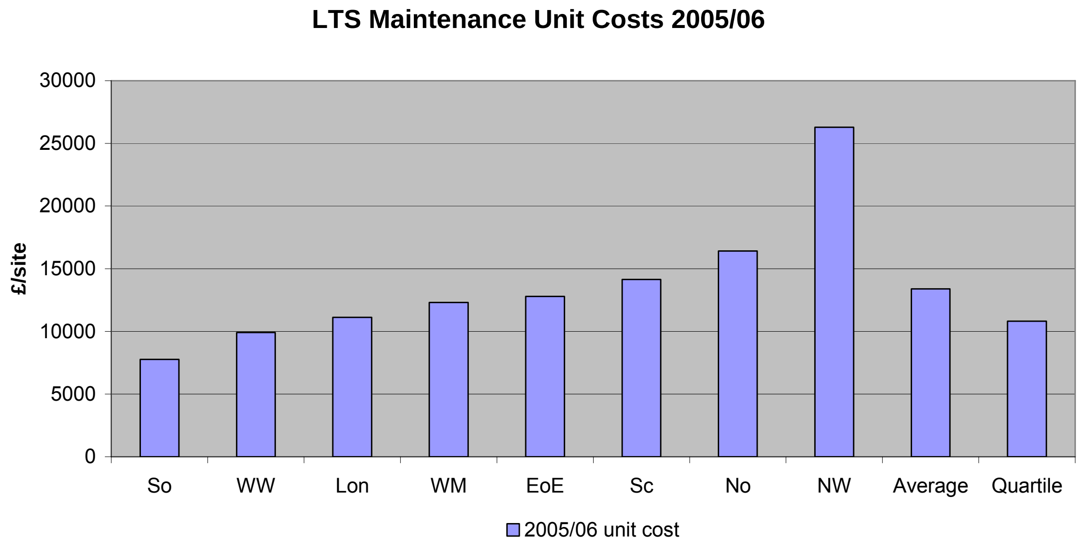

Figure 6-8

This chart shows that the average unit cost across all GDNs in 2005/06 was £13,400 per PRS and that Northern had above average unit costs. The median unit cost was £12,500 per PRS

Benchmark costs

We have determined a benchmark unit cost of £12,000 per PRS based on the bottom-up and comparative analysis.

This benchmark value represents the average annual cost across the period, recognising that because of the pattern of lumpy items such as OLI runs the actual expenditure in some years will be higher and in some years lower than the allowances proposed.

The benchmark cost applied above does not take into account the balance of pipeline, LTS PRS and NTS offtakes assets within the asset mix of Northern. Using unit maintenance costs for each of these asset types from Table 6-6 (£300/km for pipelines, £7000/LTS PRS, £48000/NTS offtake), we have calculated a maintenance cost for Northern of £2.9m pa, compared to the benchmark cost of £2.7m pa. We have applied the difference of £0.2m pa as a network specific cost allowance to reflect the additional costs of the specific asset mix in the GDN.

Across all networks the network specific costs amount to £480 per PRS, which gives an adjusted benchmark cost across all GDNs of £12480 per PRS, very close to the median unit cost from Figure 6-8.

Other costs

The amounts allowed for specific network costs are shown against the allowed adjustments line in the summary table.

Repair costs

Whilst there are cyclic costs in LTS maintenance activities such as OLI runs which follow a prescribed frequency, we consider that the above benchmark cost allows for such variations over a 5 year period.

However we do not considered the benchmark cost allows for the costs of atypical repairs resulting from the OLI analysis or which may otherwise be necessary. Recognising that not all OLI runs will lead to the need for excavation and/or repair, we believe that an average cost for repairs of £20,000 per OLI run is reasonable across the control period. We also recognized that the timing of repairs may be programmed for a convenient time after the OLI run is carried out. The proposed allowances have therefore been calculated on an average year basis, and individual year allowances should be considered over the 5 year period recognizing that in some years the expenditure will be higher and in some years lower than the allowances proposed. The number of OLI runs used to drive the repair cost is the average number over runs per annum over the period 2006 to 2012 derived from information provided by the GDN and shown in the table below.

OLI runs	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Average per annum
No. of OLI runs	[redacted]							

Table 6-8

Proposed allowances

The proposed workloads and allowances are shown in the following table. A 1% per annum reduction in the benchmark costs is included to reflect an assumed level of on-going productivity improvements.

Controllable Opex (£m)	2008/09	2009/10	2010/11	2011/12	2012/13
GDN BPQ Submission	**5.1**	**5.2**	**5.2**	**5.3**	**5.3**
Normalised Adjustments	**-1.0**	**-1.0**	**-1.0**	**-1.0**	**-1.0**
Normalised Submission	**4.1**	**4.2**	**4.2**	**4.3**	**4.3**
Unit Cost Driver	**226**	**227**	**227**	**228**	**228**
Benchmark Unit Cost	**11644**	**11527**	**11412**	**11298**	**11185**
Benchmark (Ex RF RPE)	2.6	2.6	2.6	2.6	2.6
Baseline (Ex RF RPE)	3.4	3.4	3.3	3.3	3.3
Gap	0.8	0.8	0.7	0.7	0.7
Convergence	0.6	0.5	0.4	0.3	0.2
Recommended (Ex RF and RPE)	3.2	3.1	3.0	2.9	2.8
Recommended (Inc RF and RPE)	3.4	3.4	3.3	3.2	3.2
Allowed Adjustments	0.3	0.3	0.3	0.3	0.3
Recommended (Inc RPE)	**3.7**	**3.6**	**3.6**	**3.5**	**3.4**

Table 6-9

This table shows the costs reported by the GDN in their BPQ submission and these costs adjusted by our normalisation process.

It then shows the build-up of our recommended costs as follows:

- The values of the workload driver over the period 2008/09 to 2012/13 and the benchmark unit costs which are multiplied to give the Benchmark performance. The Benchmark unit costs include PB Power's expected productivity improvements.
- Baseline performance: This is the GDN's BPQ reported performance in the base year tracked forward to 2012/13 taking account of PB Power's expected productivity improvements.
- The Gap, which is the difference between the Baseline performance and the Benchmark performance.
- Convergence: The GDNs are not expected to close any gap immediately. The convergence adjustment provides a glide path of cost to the Benchmark performance. The gap is reduced to 30% in 2012/13.
- The sum of the Benchmark performance and the convergence gives the Recommended (Ex RF and RPE) cost.
- These costs are then adjusted for our Regional Factors (RF) and our Real Price Effects (RPE)

- The allowed adjustments for specific cost areas are then added to give the Recommended cost (Inc RPE).

Chart showing Northern Recommended LTS Maintenance Opex

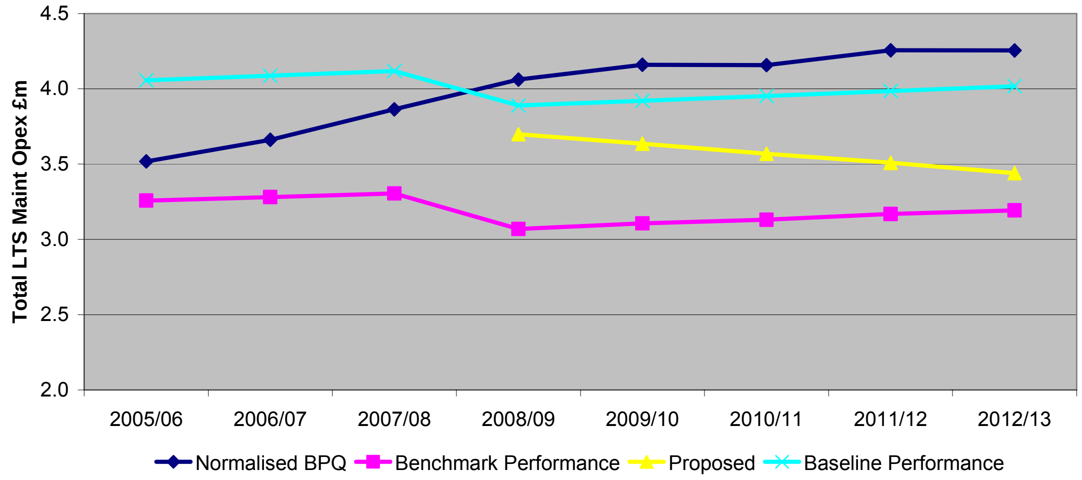

Figure 6-9

Note: the Benchmark and Baseline Performance lines include Adjustments

6.4.3.2 Storage maintenance

Northern operates 44 Low Pressure (LP) holders, 12 High Pressure bullet storage vessels, a 28 vessel underground array and rent salt cavity storage. The following chart shows Northern has less LP holders than the average GDN and that, on average, each of Northern's holders is approximately equal in volume to holders across all GDNs.

All GDN Storage Assets 2005/06

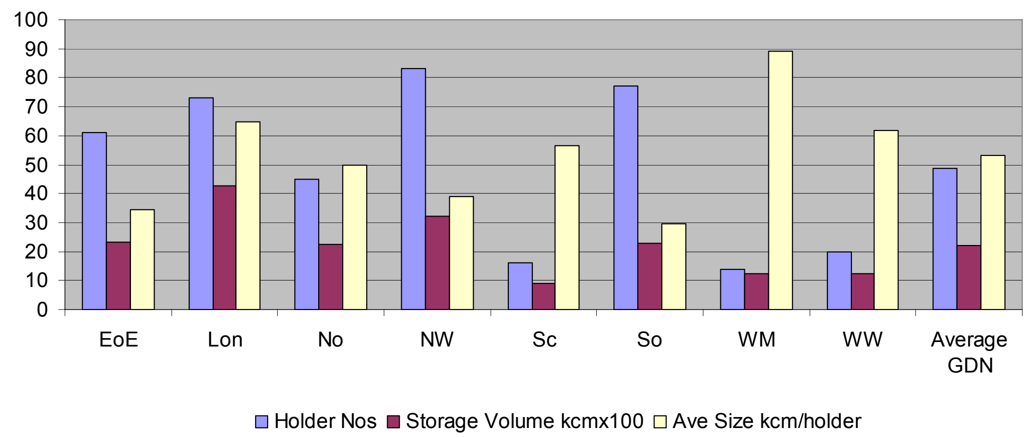

Figure 6-10

Major maintenance associated with High Pressure storage occurs infrequently and from the information provided leading up to the production of this report we have concluded that work is not planned within the control period. Very late information, albeit incomplete, suggests that this may not be the case and it may therefore be necessary to reconsider this area as part of the 2006 update. High Pressure Routine Maintenance costs are included as part of maintenance and repair costs. They are believed to be very small making little or no difference to the outcome of our analysis. Not all GDNs have been able to separate these costs.

Salt cavity rental costs are identified towards the end of this section; they have not been included in our assessment.

Storage maintenance costs are considered under the following headings:

- Maintenance and repair
- Specific costs (removed and considered separately)
    - Painting
    - Demolition
    - Working at heights regulation

Maintenance & Repair.

Northern have proposed the maintenance and repair costs shown in the following table:

2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13
Forecast number of Holders	44	44	44	44	44
Projected costs £m	2.0	2.0	2.0	2.1	2.2

Table 6-10

Our work has shown that regression analysis is not a suitable tool for assessing storage maintenance repair costs. We have therefore used unit cost and bottom-up analysis methods.

Based on our analysis of holder maintenance and repair costs across all the GDNs we believe that holder numbers is the most appropriate single driver of storage maintenance and repair costs.

Very little information has been provided about Routine Maintenance associated with High Pressure Storage and whilst we believe this to be relatively small we recommend that this area is reconsidered as part of the 2006 update.

Unit cost analysis

Maintenance & Repair covers:

- Routine Maintenance
- Inspections
- Gasholder Repairs e.g. holder valve repairs, guide roller repairs, booster overhaul etc.

An assessment of costs for Maintenance & Repairs across all GDNs has provided the basis for identification of an efficient cost level for these activities. We have considered how best to set a unit cost and have found that costs are not significantly affected by holder size, and have therefore chosen to use cost per holder as opposed to cost per thousand cubic meters (Thcm).

The following table shows the Maintenance and Repair costs per holder in 2005/06.

EoE	Lon	No	NW	Sc	So	WM	WW	Average across all GDNs
14262	11986	30089	15687	51688	22519	22500	49800	21267

Table 6-11

Bottom-up analysis

The GDN's reported costs differ widely and our analysis has failed to uncover any issues with cost allocations. Given the spread of data we have chosen to use bottom up analysis to identify a suitable benchmark.

We have referred to T/PM/MAINT/3 (Management Procedure for the maintenance of Low Pressure Storage Installations) and considered the various routine maintenance tasks detailed within the procedure. We have looked at the work required to undertake the necessary maintenance and developed manpower estimates for each of the tasks. In addition we have developed an estimate of the manpower required for repairs, which we believe to be relatively small. Manpower costs identified from storage FTE labour costs supplied by the GDNs have been applied to these estimates and this together with the average 2005/06 material costs per holder provide a maintenance and repair cost per holder as follows.

Weekly inspection and maintenance tasks	26m/d/yr
Quarterly inspection and maintenance tasks	2m/d/yr
Annual inspection and maintenance tasks	3m/d/yr
Bi-annual inspection and maintenance task (external consultancy fees allocated to MO)	1m/d/yr
5 Yearly inspection and maintenance tasks (little extra to annual)	
10 Yearly inspection and maintenance tasks	3m/d/yr
Repairs	1m/d/yr
Total	36m/d/yr @ £210/day = £7500
Materials	£11,000
Total	£18,500
*(assumption; FTE cost - £210/day gross)	

Table 6-12

** Based on average GDNs' storage costs of £49000/FTE and an estimate of 230 working days.*

We note that there could be other costs but consider that these will be small and have little effect on the results of our analysis and benchmark costs of £19000/holder.

We believe that staff utilisation can be improved particularly as monitoring systems become more prevalent and this will lead to a 1% per annum productivity improvement.

Benchmark costs

The total benchmark costs for Northern have been calculated by applying the benchmark maintenance and repair cost per holder to the number of holders for each year of the control period. The benchmark costs for Northern are shown in the following table.

2005/06 prices (excluding RPEs)	2008/09	2009/10	2010/11	2011/12	2012/13
Forecast number of Holders	44	44	44	44	44
Benchmark costs	0.8	0.8	0.8	0.8	0.8

Table 6-13

Specific costs

The amounts allowed for specific costs are shown against the allowed adjustments line in the summary table.

Gasholder Painting

Northern has proposed the painting costs shown in the following table:

2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13
Storage volume (Thcm)	2632	2632	2632	2632	2632
Projected costs £m	0.5	0.5	0.5	0.5	0.5

Table 6-14

Storage volumes are based on the declared 2005/06 LP holder volume. This has been adjusted to mirror the reported available storage profile and holders demolished over the period.

Gasholder painting, which can account for more than 25% of the total maintenance costs, was considered on a national basis prior to GDN sales and some GDNs have reported that the process for prioritising work was in need of review. We believe that this may have resulted in differing volumes of work being carried out across the GDNs prior to sale and in 2005/06. All GDNs now have the basis of a painting programme in place together with a process for prioritising work for their networks. Generally they consider that gasholders will require repainting every 10 – 15 years.

Clearly the volume of work can and will vary from year to year. We have therefore, looked at the total cost of gasholder painting from 2005/06 to 2012/13 for all GDNs and the following analysis of the average annual cost against the number of holders installed gives a unit cost of £15,400 per annum per installed holder.

We believe that regression analysis provides a good analysis tool for the assessment of holder painting costs and since linear regression provides a significantly better fit to the data sets, this technique has been used in preference to logarithmic linear regression.

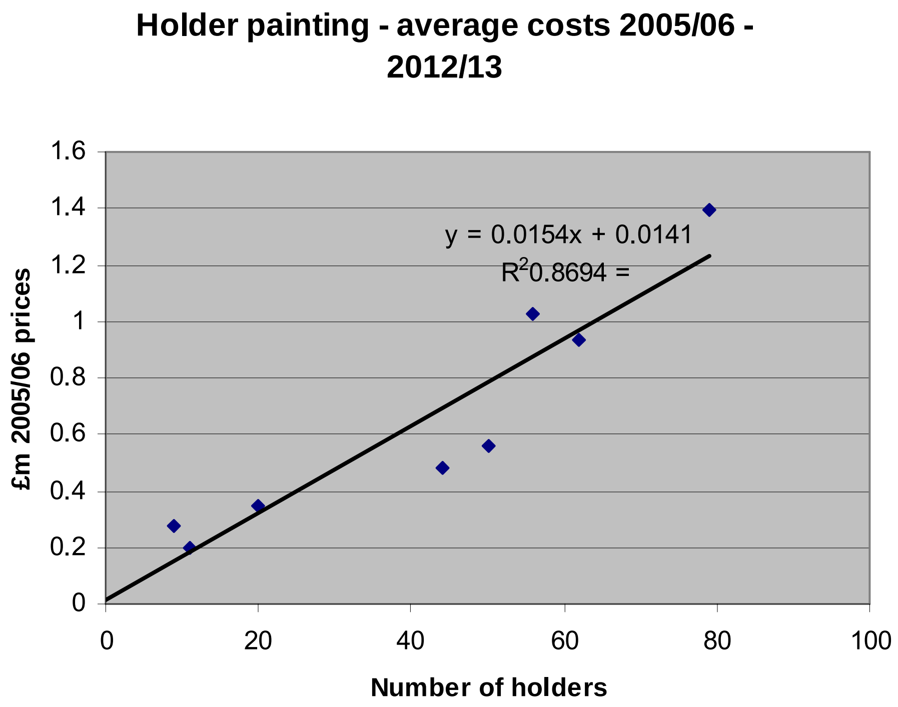

Figure 6-11

We consider that generally a 15 year painting cycle is adequate, but recognise that there will be occasions where adverse conditions require some holders to be painted more frequently. Therefore, for the purpose of assessment we have used a repainting cycle of 13 years. This equates to an average unit cost of £200,000 (£15,400x13) per holder painted, equivalent to £3360 per Thcm of storage.

The following chart indicates the repainting cycle that GDNs appear to be adopting based on their projected 5 year costs and the average unit costs identified above. This suggests that Northern are forecasting expenditure at a rate that will repaint all their holders approximately every 18 years.

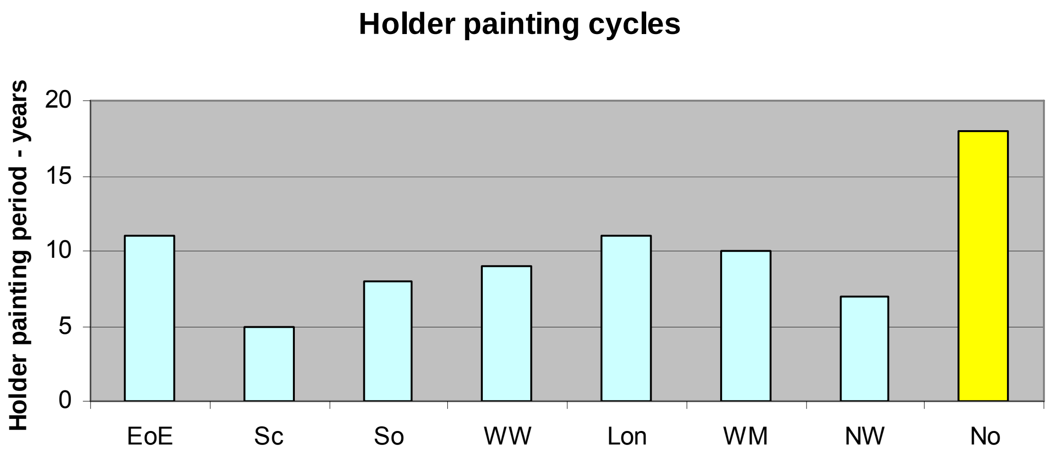

Figure 6-12

Whilst we have not carried out bottom-up or separate unit cost analysis, we have carried out additional regression analysis and consideration has been given to type and size of holder. It has been assumed that there will be an average mix of holders with above/below ground tanks but this has not been explicitly considered in developing our costs. We have taken account of spiral and column guided holders, which have a greater surface area to be painted. From detailed information supplied by the GDNs, we have analysed tendered and estimated costs for the painting of specific holders.

We have carried out regression analysis of these detailed painting costs for the two main types of holders. This analysis, gives a unit cost of [redacted] for spiral built holders and [redacted] for column built holders (see charts below). It can be seen from the charts that any element of fixed costs is small. Given the many differences between holders and an estimated 60/40 (spiral/column) split in holders across all GDNs we have adjusted the unit cost to [redacted] (spiral) and [redacted] (column) to give an average combined unit cost of [redacted]. This is in line with the average cost analysis above (£3360/Thcm) and we have used these adjusted unit costs for spiral and column guided holders as our benchmark unit costs.

[Chart redacted]

Figure 6-13

[Chart redacted]

Figure 6-14

From the detailed information provided by Northern (SQ NGN153) we have identified a 65 / 35 (spiral / column) split in the type of holders in Northern's network and this gives a combined unit cost of [redacted] These costs, together with a 13 year repainting cycle and the appropriate storage volume provide the benchmark gasholder painting costs shown in the following table. The benchmark costs are not intended to give an actual spend profile but should be viewed as a total sum of money available to be spent over the control period. Given careful condition monitoring, "patch painting" may well produce some savings against our proposed costs.

2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13
Storage volume (Thcm)	2632	2632	2632	2632	2632
13yr cycle Benchmark costs £m	0.7	0.7	0.7	0.7	0.7

Table 6-15

Working at Heights Regulations

Modification to holder handrails and fall arrest systems etc. are necessary to comply with the Working at Heights Regulations. Different assumptions have been made by the GDNs regarding the classification of this expenditure as Capex or Opex. Northern classifies this expenditure as Capex (LTS & Storage), but to ensure comparability for the purpose of this assessment, we have treated these costs as Opex.

£m	2008/09	2009/10	2010/11	2011/12	2012/13
	0.2	0.1	0.1	0.1	0.1

Table 6-16

The following chart indicates that Northern's costs are below the average of costs across all GDNs for these works.

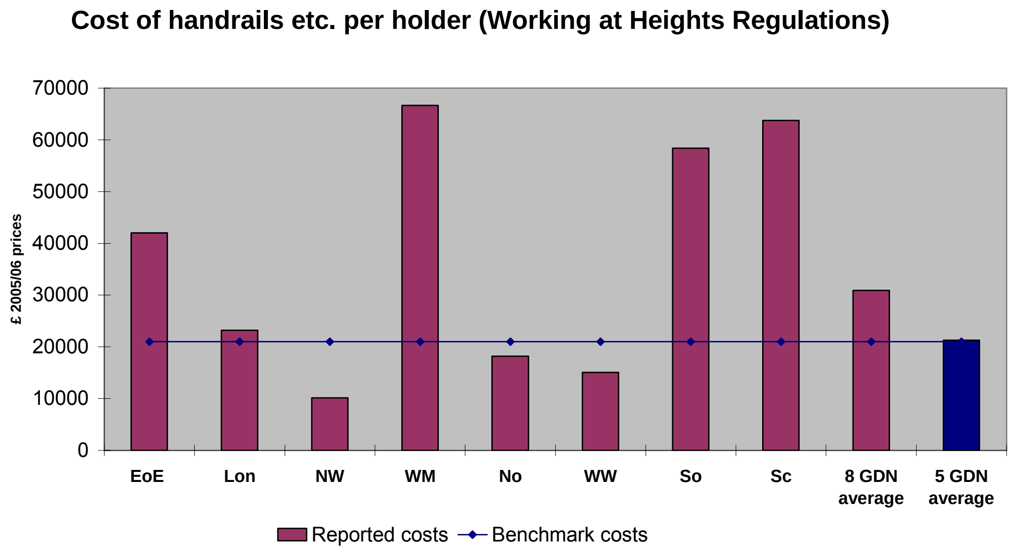

Figure 6-15

GDN costs for these modifications vary widely and analysis has failed to clearly identify a benchmark. Comparing GDN costs per holder or costs per Thcm of storage makes little or no difference. It is our view that costs should be directly related to holder numbers.

We believe that the outlying GDNs indicated above have significantly over estimated the costs for these works and note that they have yet to undertake any of this work. We have looked more closely at GDNs where work has been started and we believe that the overall GDN average cost is high. We have therefore applied the average cost/holder of the remaining 5 GDNs (£21000/holder) as the benchmark unit cost.

For Northern, the total costs for modifications to handrail and fall arrest system etc. are estimated as follows:

2005/06 prices (£m)	
Average No. of holders (control period)	44
Benchmark costs (No. of holders x £21,000)	0.9m

Table 6-17

Taking into account proposed expenditure by the GDN prior to 2008/09, the proposed allowance for these modifications in the control period is as follows:

2005/06 prices excluding RPEs	Prior to 2008/09	2008/09	2009/10	2010/11	2011/12	2012/13
	0.2	0.1	0.1	0.1	0.1	0.1

Table 6-18

Demolition

Given the ever increasing value of land we agree with the assumption made by some GDNs that any holder demolition will be funded by land sales.

Northern has not included any monies for holder demolition.

Summary

The following table summarises our proposed costs for storage maintenance.

We have assumed productivity improvements of 1% per annum.

Controllable Opex (£m)	2008/09	2009/10	2010/11	2011/12	2012/13
GDN BPQ Submission	**2.9**	**2.9**	**2.9**	**3.0**	**3.1**
Normalised Adjustments	**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-0.9**
Normalised Submission	**2.0**	**2.0**	**2.0**	**2.1**	**2.2**
Unit Cost Driver	**44**	**44**	**44**	**44**	**44**
Benchmark Unit Cost	**18436**	**18251**	**18069**	**17888**	**17709**
Benchmark (Ex RF RPE)	0.8	0.8	0.8	0.8	0.8
Baseline (Ex RF RPE)	1.3	1.3	1.3	1.3	1.3
Gap	0.5	0.5	0.5	0.5	0.5
Convergence	0.4	0.3	0.3	0.2	0.1
Recommended (Ex RF and RPE)	1.2	1.1	1.1	1.0	0.9
Recommended (Inc RF and RPE)	1.2	1.2	1.1	1.1	1.0
Allowed Adjustments	1.2	1.2	1.2	1.2	1.2
Recommended (Inc RPE)	**2.5**	**2.4**	**2.3**	**2.3**	**2.2**

Table 6-19

This table shows the costs reported by the GDN in their BPQ submission and these costs adjusted by our normalisation process.

It then shows the build-up of our recommended costs as follows:

- The values of the workload driver over the period 2008/09 to 2012/13 and the benchmark unit costs which are multiplied to give the Benchmark performance. The Benchmark unit costs include PB Power's expected productivity improvements.
- Baseline performance: This is the GDN's BPQ reported performance in the base year tracked forward to 2012/13 taking account of PB Power's expected productivity improvements.
- The Gap, which is the difference between the Baseline performance and the Benchmark performance.
- Convergence: The GDNs are not expected to close any gap immediately. The convergence adjustment provides a glide path of cost to the Benchmark performance. The gap is reduced to 30% in 2012/13.
- The sum of the Benchmark performance and the convergence gives the Recommended (Ex RF and RPE) cost.
- These costs are then adjusted for our Regional Factors (RF) and our Real Price Effects (RPE)
- The allowed adjustments for specific cost areas are then added to give the Recommended cost (Inc RPE).

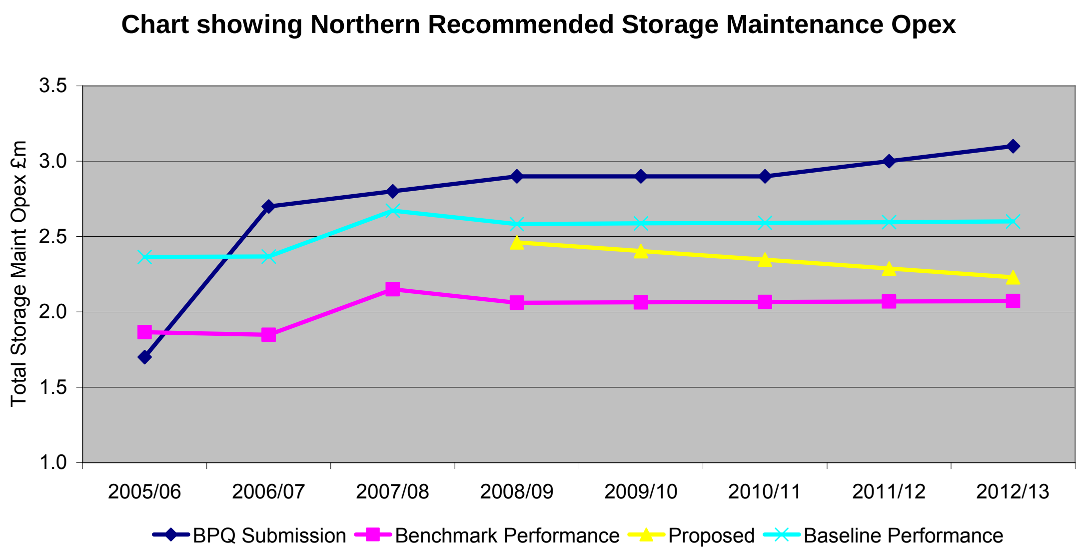

Figure 6-16

Note: the Benchmark and Baseline Performance lines include Adjustments

6.4.3.3 Maintenance other

Company projections

NGN Northern Network's projections of expenditure for the period to 2012/13 are shown in the figure below.

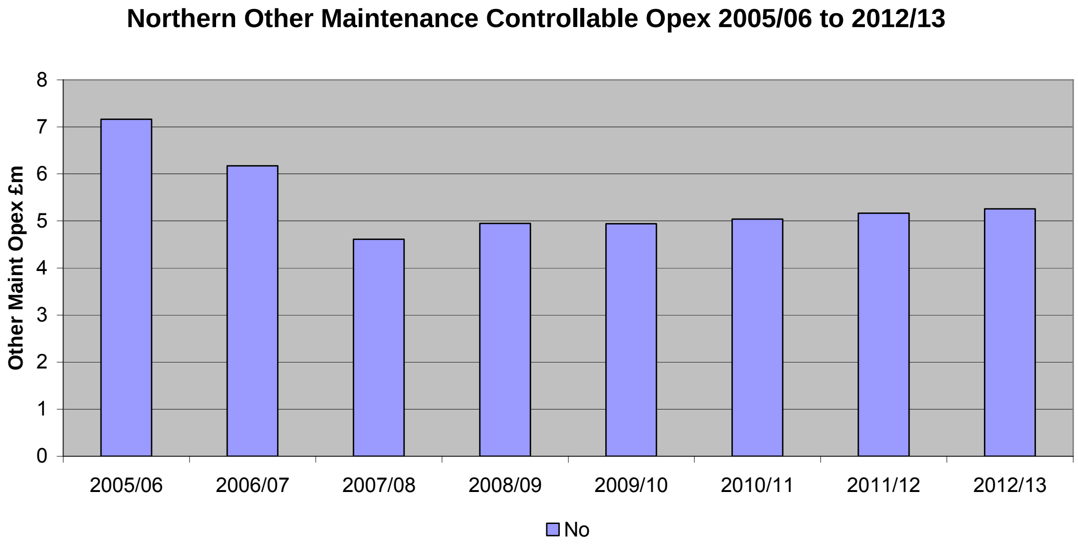

Figure 6-17

Benchmark costs

As discussed earlier in this Section, we have carried out work to bring costs onto a consistent basis. Nevertheless there is no clear relationship between these costs and network length, throughput or other drivers.

In order to understand the wide differences in their reported costs, GDNs were requested to allocate their projected costs into the following four principal activities as defined in the BPQ Guidance Notes, these are:

- Other Leakage Control
- Distribution Mains and Services R & M
- Instrumentation R & M
- District Governors

Only two GDNs, Northern being one, were able to respond as requested, the remainder included other costs, which they were unable to apportion to the four categories, These additional costs included, staff costs, non staff costs, transport, and `other`. However, by allocating these additional costs in proportion to the costs returned for the four principal activities by the 6 GDNs, assumed costs have been derived to enable cost analyses and comparisons to be made.

We have calculated an average split across each of these activities and also provided the range across GDNs in the table below.

Activity	Percent of Maintenance Other Average %	Range %
Leakage Control	15	6 - 31
M & S Repairs and Maintenance	43	32 - 58
Instrumentation	15	5 - 29
District Governors	27	19 - 38

Table 6-20

We therefore propose to establish benchmark costs by bottom-up analysis.

The following chart shows the reported costs for all GDNs, expressed as costs/km and the average and quartile values.

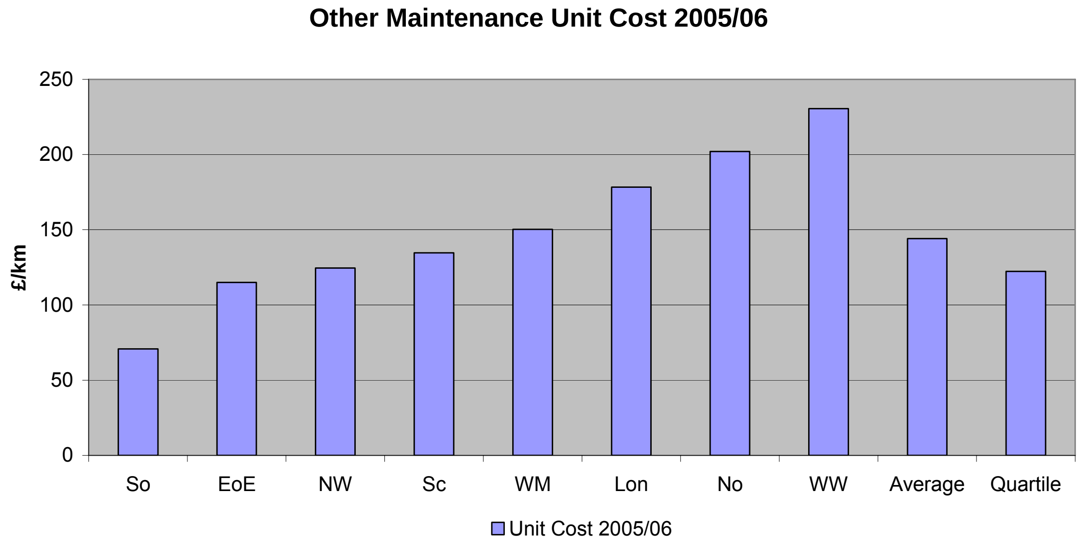

Figure 6-18

It would be reasonable to expect some minor economies of scale to be reflected in the costs, but for the most expensive to exceed the lowest unit cost more than threefold is not credible. We can only surmise that there may be coding errors between these activities, and also with other activities such as Emergency and Repairs. We have explored relationships with a range of drivers which we believe could be relevant, and we can find no evidence which points to any specific factors which explains the differences.

Unit costs for Northern, at £202£/km, are 40% above the average unit cost derived from the normalised submitted data. But future years show a reducing forecast to 35% below the current level in 2007/08, stabilising at approx 30% below the current level 2008/09 to 2012/13.

6.4.3.4 Bottom Up Analysis

Benchmark costs are developed for each of these activities in turn. Instrumentation and district governor costs are considered together.

Mains and Services R & M

What is clear from the table 6-19, is that that Distribution Mains and Service (M & S) repair and maintenance cost is the largest of the four cost elements of Maintenance Other, and in that respect, the primary driver of cost was assumed to be related to network size.

However, regression analysis has been unable to reveal a robust relationship from the GDN data points for 2005/06 or 2006/07.

In addition to network length we have reviewed other cost drivers including non-PE pipe length, which is assumed to require more maintenance than PE pipe, energy throughput, service population, and emergency repairs numbers. We did recognise a relationship with emergency repairs, which infers that these costs are driven by the general condition of the pipe network.

To assess base costs, we have assumed that mains R & M work is identified as a consequence of carrying out a repair arising from an external PRE, and is generated in about 10% of such cases. We also assume that the average number of service R & M jobs is similar to the number of mains jobs.

We assume that the cost of an average mains R & M job is similar to the cost of an average repair job. This because the type and scale of tasks involved in the repair of mains are similar whether the repair arises because of a PRE or because of a condition assessment. We have therefore assumed that the cost of an average mains R&M job is £470 and of an average service R & M job is £235 (see Table 5-2 adjusted for efficiencies arising from programmed works).

For Northern there were 23824 PRE related repairs in 2005/06. On the above assumptions this would give 2382 mains R & M and 2382 service R & M jobs per year, and using the unit cost assumed above would give a total R&M cost of £1.7 m for 2005/06.

The above figures are equivalent to viewing the unit cost as £70.5 per Emergency Repair.

District Governor and Instrumentation Maintenance

After exploring potential relationships for unit costs covering the Instrumentation and District Governor maintenance areas, it was found that combining the two types of maintenance, gave the best results, albeit still not ideal plots because of one outlier.

In carrying out the regression analysis, we have excluded the outlier (shown as a yellow point on the graph) because we consider that there could be costs inconsistent with our cost allocation assumptions included in that networks costs. We have been unable to identify the inconsistency.

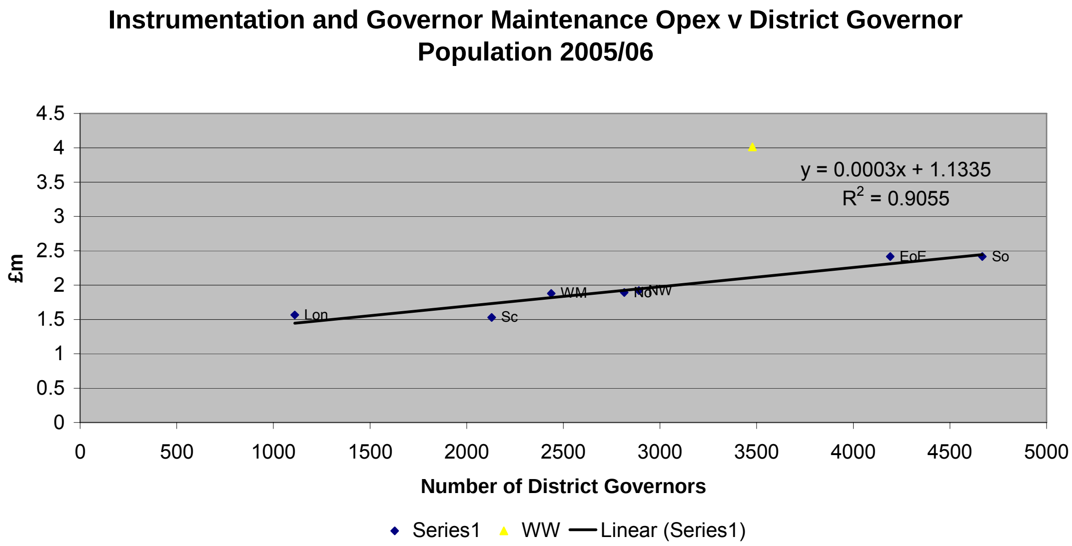

Figure 6-19

Using the district governor population as the driver for these costs provided the best data fit using linear regression. Because we have included only 7 points we believe it is appropriate to use the regression line as the benchmark cost line rather than upper quartile line.

This gives a unit cost of £281 per district governor for Instrumentation and Governor maintenance, plus a fixed cost of £1.1m per GDN.

Other Leakage Control

This activity is in rather a different category from the remainder, in that it is almost wholly elective. A GDN can elect to spend little on this activity, in the belief that it will save money and the additional leakage related costs for shrinkage, PREs and repairs, will be more than offset by the savings in the leakage control programme.

Northern have stated that they do not intend to install new gas conditioning units, and review the operation of existing units every 3 years.

There was a wide range of costs returned for this sub-activity, reflecting different choices by the GDNs.

The other factors to consider are that the replacement programme will reduce the length of pipe susceptible to joint and corrosion leakage and the responsibility of, where possible, reducing the volume of methane released into the natural environment.

We are also aware that we have adjusted work volumes in both emergency and repair activities in the expectation that this will drive a higher spend on preventative measures in order to achieve the reductions in work volumes that we forecast.

The range of expenditure for this activity submitted by the GDNs is from £75per km of non PE main, down to £35 per km.

For this review period, we recommend that expenditure is set based upon the lower end of the range, and propose that the rate is set at £35 per km of non-PE mains (2005/06 prices).

Although our proposals are for £35/km of expenditure, we believe that there will be operational cost savings if Northern made expenditures up to £75/km of non-PE main which could be self financing.

Summary of costs

The above analysis has established the efficient level of cost for Maintenance Other activities. The following table shows the build up of the frontier costs that would apply in 2005/06 to Northern Network.

Activity	Cost Driver	Unit Cost (£)	Cost (£m)
Leakage Control	Length of non-PE main km 17066	35	0.6
Mains and Services Repairs & Maintenance	No of Repairs 23824	70.5	1.7
District Governors and Instrumentation	Total governors 2815	281	0.8
	Fixed cost		1.1
Total			4.2

Table 6-21

We recognise that in deriving this cost we have made a number of assumptions. As a check, the proposed total expenditure in 2005/06 of £4.2m is equivalent to £118/network km compared to the average cost reported by GDNs of £144/km and Northern reported cost of £202/km (see Fig 6-17).

Given the divergent data which has been supplied, and upon which this report is based, we believe that our approach to setting expenditure for Maintenance Other is reasonable, and the results, in the absence of more concrete alternatives, should be used as a basis for forecasting

We have developed our recommended costs by taking the benchmark costs for 2005/06 and projecting this cost forward, which gives the following forecast:

Controllable Opex (£m)	2008/09	2009/10	2010/11	2011/12	2012/13
GDN BPQ Submission	**4.7**	**4.7**	**4.8**	**4.9**	**5.0**
Normalised Adjustments	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
Normalised Submission	**4.9**	**4.9**	**5.0**	**5.1**	**5.2**
Benchmark (Ex RF RPE)	3.9	3.8	3.7	3.6	3.5
Baseline (Ex RF RPE)	7.0	6.9	6.8	6.7	6.7
Gap	3.1	3.1	3.1	3.1	3.1
Convergence	2.4	2.0	1.7	1.3	0.9
Recommended (Ex RF and RPE)	6.2	5.8	5.4	4.9	4.5
Recommended (Inc RF and RPE)	6.5	6.2	5.8	5.5	5.1
Allowed Adjustments	0.0	0.0	0.0	0.0	0.0
Recommended (Inc RPE)	**6.5**	**6.2**	**5.8**	**5.5**	**5.1**

Table 6-22

This table shows the costs reported by the GDN in their BPQ submission and these costs adjusted by our normalisation process.

It then shows the build-up of our recommended costs as follows:

- The values of the workload driver over the period 2008/09 to 2012/13 and the benchmark unit costs which are multiplied to give the Benchmark performance. The Benchmark unit costs include PB Power's expected productivity improvements.
- Baseline performance: This is the GDN's BPQ reported performance in the base year tracked forward to 2012/13 taking account of PB Power's expected productivity improvements.
- The Gap, which is the difference between the Baseline performance and the Benchmark performance.
- Convergence: The GDNs are not expected to close any gap immediately. The convergence adjustment provides a glide path of cost to the Benchmark performance. The gap is reduced to 30% in 2012/13.
- The sum of the Benchmark performance and the convergence gives the Recommended (Ex RF and RPE) cost.
- These costs are then adjusted for our Regional Factors (RF) and our Real Price Effects (RPE)
- The allowed adjustments for specific cost areas are then added to give the Recommended cost (Inc RPE).

The comparison between the normalised BPQ forecast, the target and recommended expenditure is shown in the following figure:

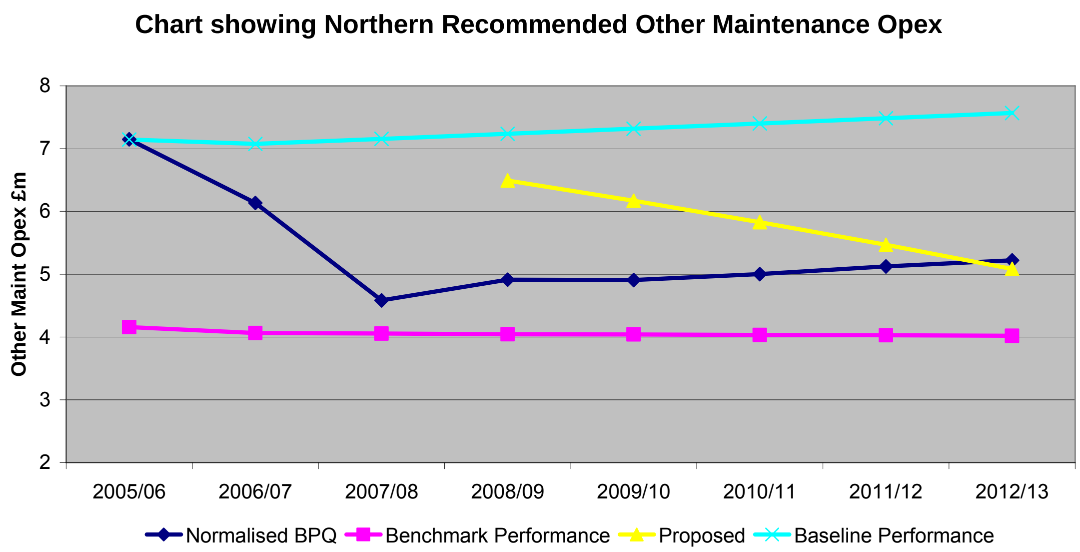

Figure 6-20

Note: the Benchmark and Baseline Performance lines include Adjustments

6.4.4 <u>REAL PRICE INCREASES</u>

Section 2.7 sets out the approach to real price effects proposed by PB Power.

In addition to any efficiency adjustments, the Network costs have been normalised by adjustments to remove the GDN real price effects and the PB Power real price effect assumptions have subsequently been added in deriving the proposed allowances.

6.4.5 <u>RECOMMENDATIONS</u>

Table 6-1 shows the build-up of the recommended costs for the price control period (2008/09 to 2012/13) for Maintenance.

7 OTHER DIRECT ACTIVITIES

7.1 SUMMARY

Controllable Opex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission	18.0	16.7	18.9	18.8	17.6	**90.0**
Normalisation Adjustments	-16.0	-14.5	-16.7	-16.6	-15.4	**-79.3**
Normalised BPQ	2.0	2.2	2.2	2.2	2.2	**10.7**
Adjustments	-0.4	-0.6	-0.6	-0.7	-0.7	**-3.1**
Proposed	**1.6**	**1.6**	**1.5**	**1.5**	**1.5**	**7.6**

Table 7-1

7.2 POLICIES & PROCEDURES

7.2.1 INTRODUCTION

NGN has a clear route of governance by which policies and procedures are formed, approved, and implemented. We have seen evidence that they have identified a hierarchy of documents starting from those required by Legislation down to detailed work procedures. They have adopted appropriate documents from recognised Industry sources, such as IGEM. They have a company review panel which identifies the need for new or reviewed documents brought about by Legislation or internal company requirements.

The main areas covered by Other Direct Activities are:

- Tools and Consumables
- Odorant
- Gas Quality Support

Governance of policies and procedures for these activities must support the safe and efficient operation of plant and safe and efficient operational practice by Network staff, and service providers.

7.2.2 SCOPE OF POLICES AND PROCEDURES

At the point of sale, NGN inherited a satisfactory and complete suite of policies and procedures from NGG. Most of these policies and procedures remain in use, with minor editing to acknowledge the ownership change. We have found no evidence that policies and procedures have either been abandoned or relaxed in a significant way, leading to our conclusion that, from the evidence provided in BPQ responses, the scope of policies and procedures in use, including those relevant to Other Direct Activities, continue to be both satisfactory, and complete.

Appendix 1 reviews the financial and technical framework under which NGN operates, the structure they utilise to manage their assets effectively and the key policies they adopt to ensure they meet their statutory and licence obligations and other regulatory requirements.

7.2.3 REVIEW AND UPDATE PROCESS

The Network has a Policy Framework Review Panel which is convened to consider changes to the policies and procedures, which may be prompted by changes in external Legislation, other external drivers such as Ofgem requirements, changes/updates in IGEM documents, or from identified internal Network requirements.

The Panel may consist of NGN personnel, service provider personnel and external specialists and/or consultants. The Panel will manage the production of draft documents, which are reviewed by a peer group, before being submitted to the Gas Network Special Engineering

Committee (GNSEC), for approval and/or implementation. Governance responsibility for all documents is held by NGN.

When new documents are approved, briefings and/or detailed training are given to those affected.

7.2.4 EFFICIENCY AND PRODUCTIVITY

We have not carried out detailed audits of the degree of compliance within the Network, to the stated Policies and Procedures. However, within the Other Direct Activities category, we can say, that from the evidence offered within the BPQ responses, there are no indications that they are not being followed. There is no evidence of systemic failures of equipment or practice, which could indicate lack of compliance. Similarly, within safety related statistics, such as incidents or lost time accidents, there is not evidence of unsafe practices being employed, which could be used as an indicator of the lack of compliance with documented Policies and Procedures.

NGN have implemented a business model, which out sources work delivery to an independent service provider, whilst retaining asset management and maintenance strategic policies and workload setting, within NGN. Early indications, during the first two years, are that the model is providing a robust mechanism for controlling Opex performance overall.

We recommend that the current approach to policies and procedures is viewed as efficient and provides a satisfactory basis for forecast projections.

7.3 HISTORICAL PERFORMANCE

7.3.1 INTRODUCTION

We would expect the historical performance of Other Direct Activities to be represented by a combination of historical management, cost and performance information for these activities. This historical performance data would be helpful in developing trends of workload, costs, and unit costs, which could be then used as comparisons year to year, and also to make comparisons with other GDNs' performance.

However, in the years preceding 2005/06, Transco and latterly National Grid undertook a number of organisational restructures. During these periods, changes occurred in the way that costs were allocated across Networks and activities. Robust inter-year, and inter-Network comparisons on costs prior to 2005/06 are therefore not possible.

We have used cost data only for the years 2005/06 and 2006/07 to form historical trends.

7.3.2 DEFINITION OF ACTIVITY

The main areas covered by Other Direct Activities are:

- Tools and Consumables – including repair, maintenance and purchase of small tools and equipment plus consumables not specific to individual jobs
- Odorant – the provision of odorised gas from NTS offtakes
- Gas Quality Support

7.3.3 ESTABLISH UNDERLYING COSTS

The following costs have been included within Other Direct Activities:

- Materials
- Miscellaneous Expenditure
- Net Staff Costs (including Agency Costs)
- New Service Agreements
- Professional and Consultancy Fees
- Subcontractors

Cost normalisation

Section 2.5.1 gives details of the generic normalisation adjustments which have been carried out. For Other Direct Activities, the principal normalisation adjustments are outlined below.

- **Cost transfer** – there have been two transfers from Other Direct Activities These relate to the costs associated with shrinkage and xoserve which have been moved to new categories for clarity of analysis.
- **GDN reallocation** – the outcome of reallocation process in which NGN identified the changes to the allocation of costs to reflect our proposed allocation of sub-activities13.
- **Accounting adjustments** – which have been provided by Ofgem
- **Pensions adjustments** – these adjustments are the net adjustments between NGN's reported pension costs and the standard pension costs used by PB Power
- **Removed costs** – there are no removed costs in the Other Direct Activities category.

The detail of the adjustments to the BPQ costs submitted by NGN for Northern network, is given in the following table.

Normalisation Adjustments	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Cost transfer	-13.9	-15.2	-14.7	-16.0	-14.6	-16.8	-16.7	-15.5	-123.4
Shrinkage	-10.8	-11.5	-10.8	-10.9	-11.2	-11.6	-11.9	-12.1	
xoserve	-3.1	-3.7	-3.9	-5.1	-3.4	-5.2	-4.8	-3.4	
GDN reallocation	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ofgem Accounting Adjustments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pension Adjustments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Removed costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**-13.7**	**-15.3**	**-14.7**	**-16.0**	**-14.5**	**-16.7**	**-16.6**	**-15.4**	**-123.1**

Table 7-2

In their initial BPQ responses, only 6 networks reported costs in the range of categories identified for Other Direct Activities. In the case of the other 2 networks, the equivalent costs had been allocated to the other Opex activity areas. Responses to Supplementary Questions, which resulted in reallocation of costs across all Opex activities, have enabled comparable data for all 8 networks to be compiled.

The cost reallocation principally involves the transfer of cathodic protection remedial work costs to LTS maintenance and leakage control survey costs from Other Maintenance for consistency purposes.

The 2005/06 and 2006/07 normalised BPQ data, adjusted for regional factors for all GDNs is shown in Table 7-3 below:

[13] Full details of the GDN reallocation are given in Appendix 6

Controllable Other Direct Activities Opex adjusted for regional factors (£m)	2005/06	2006/07
East of England	3.4	2.6
London	1.3	1.4
Northern	4.4	1.5
North West	0.0	1.4
Scotland	1.1	1.1
Southern	3.1	3.1
West Midlands	1.2	1.2
Wales and West	4.2	2.0

Table 7-3

The Northern figure for 2005/06 includes £1.3m for New Service Agreement Costs for the period of April and May 2005 before network sale, which accounts for part of the reduction between the two years.

7.3.4 PROPOSE EFFICIENT LEVEL OF COSTS

Section 2 sets out the approach we use to set frontier costs. The following techniques are used:

- Bottom-up analysis.
- Regression analysis
- Unit cost analysis

To use these techniques we need to establish a cost driver or explanatory variable.

There are a number of potential drivers for the components of Other Direct activities, all of which are related in some way to the size or scale of the network operation. The two key factors which have been examined are total network length (distribution above and below 7 bar plus LTS) and network throughput.

Bottom-up analysis is not used for the assessment of Other Direct activities due to the diverse nature of the activities involved.

As discussed in Section 2, the starting point for setting the target benchmark is an Ordinary Least Squares (OLS) regression on the eight data points, one for each GDN, applicable in the base year (2005/06). The regression calculation determines a relationship between the costs and the workload driver. The regression line is shown in black on the graphs.

A number of regression options have been explored for Other Direct Opex, and we consider that logarithmic linear regression provides the best fit to the data set.

As discussed in Section 2 we have then adjusted the regression line to give the upper quartile regression line which is the target which all under performing GDNs should move towards. This is shown in pink on the charts.

High performing networks will be expected to continue to improve their performance over the period to 2012/13. The resulting target costs for 2012/13 are shown in yellow on the charts.

Most networks have reported substantial changes between 2005/06 Other Direct Activity costs and their forecast for 2006/07, in many cases related to transitional effects following the network sale process. We have therefore examined the costs for both years to establish the most suitable data set to use for our base year analysis.

The regressions for 2005/06 Other Direct Activity expenditure and for the 2006/07 forecast expenditure have been investigated using total network length and separately throughput as explanatory variables. This analysis has shown that total network length provides a better basis for comparison between networks. In addition, the 2006/07 GDN expenditure forecasts when compared against total network length on a logarithmic linear basis provide a robust distribution with a good fit, on which to identify frontier and upper quartile performance, as demonstrated in Figure 7-1. Northern's performance sets the frontier after allowing for regional factors.

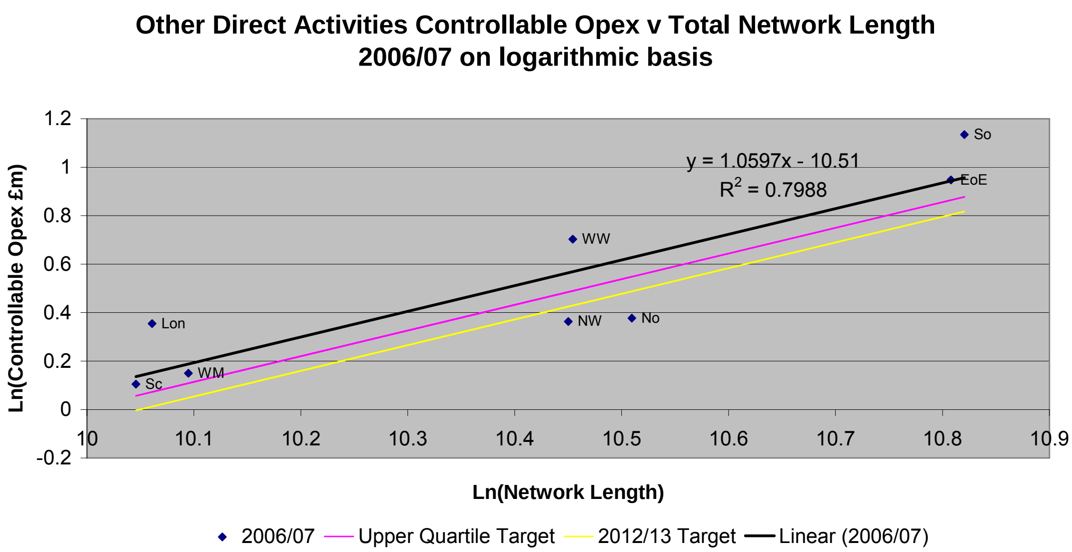

Figure 7-1

This relationship between network length and cost shown on the graph is used to determine our cost projections for future years with network length as the cost driver.

We consider that the regression fit is sufficiently good not to carry out a separate unit cost analysis.

7.4 FORECAST

7.4.1 INTRODUCTION

The conclusions of the policy review are that NGN has adopted and continued to implement the inherited policies and procedures, and has in place a robust governance regime to review these, and to propose new policies and procedures, to meet external and internal drivers. The Network's approach is viewed as efficient and providing a satisfactory basis for forecast projections.

The examination of historic data suggests that Northern network is achieving efficient performance in the area of Other Direct Activities, when adjusted for regional factors.

The general factors affecting forecast costs are the inflationary pressures on Contractor, Staff and Material costs. NGN has used their own assumptions on these to prepare their company proposals.

7.4.2 COMPANY PROPOSALS

The key company assumptions are set out in section 2.7 of this report. The company cost trend lines for 2006/07 to 2012/13 as proposed by NGN for Northern, together with the other networks, are shown in Figure 7.2:

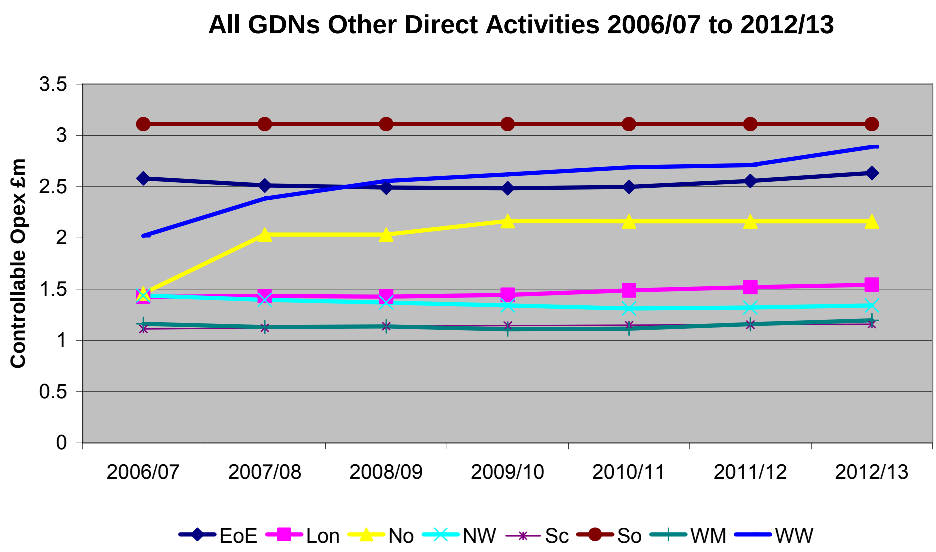

Figure 7-2

7.4.3 PROPOSED PROJECTIONS

The regression analysis based on 2006/07 forecast costs and network length, the results of which are represented in Figure 7-1, identifies the upper quartile performance level, which has been used as the benchmark which GDNs should move toward during the period.

In order to form a view of the speed at which the GDN should be expected to move towards this benchmark performance, extrapolation of the base year performance has also been carried out for the whole period using our assumptions for productivity improvement.

NGN has not quantified a level of efficiency improvement for Other Direct Activities. However, we are of the opinion that there is scope for improvement driven by optimised management of operations and contractual arrangements across the range of activities. We have therefore assumed and applied a 1% year on year improvement in productivity for the Other Direct Activities area.

Figure 7-3 shows Northern's expenditure projections for Other Direct Activities over the period 2005/06 to 2012/13. Northern's baseline performance out performs the benchmark target over the period of the forecast. Therefore, our expenditure projection is reduced to be in line with baseline performance in 2012/13.

7.4.4 SPECIFIC COST AREAS

There are no specific high cost `spikes` in expenditure in this area of activity during the period 2006/07 to 2012/13.

7.4.5 REAL PRICE INCREASES

Section 2.7 sets out the approach to real price effects proposed by PB Power.

In addition to any efficiency adjustments, the Network costs have been normalised by adjustments to remove the GDN real price effects and the PB Power real price effects have subsequently been added in deriving the proposed allowances.

The following table sets out the principal results of the analysis:

Controllable Opex (£m)	2008/09	2009/10	2010/11	2011/12	2012/13
GDN BPQ Submission	**18.0**	**16.7**	**18.9**	**18.8**	**17.6**
Normalised Adjustments	**-16.0**	**-14.5**	**-16.7**	**-16.6**	**-15.4**
Normalised Submission	**2.0**	**2.2**	**2.2**	**2.2**	**2.2**
Regression Driver km	**36663**	**36662**	**36659**	**36669**	**36665**
Benchmark (Ex RF RPE)	1.7	1.7	1.7	1.6	1.6
Baseline (Ex RF RPE)	1.4	1.4	1.4	1.4	1.4
Gap	-0.3	-0.3	-0.3	-0.3	-0.3
Convergence	-0.1	-0.2	-0.2	-0.2	-0.3
Recommended (Ex RF and RPE)	1.6	1.5	1.5	1.4	1.4
Recommended (Inc RF and RPE)	1.6	1.6	1.5	1.5	1.5
Allowed Adjustments	0.0	0.0	0.0	0.0	0.0
Recommended (Inc RPE)	**1.6**	**1.6**	**1.5**	**1.5**	**1.5**

Table 7-4

This table shows the costs reported by the GDN in their BPQ submission and these costs adjusted by our normalisation process.

It then shows the build-up of our recommended costs as follows:

- The values of the regression driver over the period 2008/09 to 2012/13 and the benchmark performance from the analysis. The Benchmark unit costs include PB Power's expected productivity improvements.
- Baseline performance: This is the GDN's BPQ reported performance in the base year tracked forward to 2012/13 taking account of PB Power's expected productivity improvements.
- The Gap, which is the difference between the Baseline performance and the Benchmark performance.
- Convergence: The convergence adjustment provides a glide path of cost to the 2012/13 Baseline performance.
- The sum of the Benchmark performance and the convergence gives the Recommend (Ex RF and RPE) cost.
- These costs are then adjusted for our Regional Factors (RF) and our Real Price Effects (RPE)
- The allowed adjustments for specific cost areas are then added to give the Recommend cost (Inc RPE).

The comparison between the normalised BPQ forecast, the target and recommended expenditure is shown in the following figure:

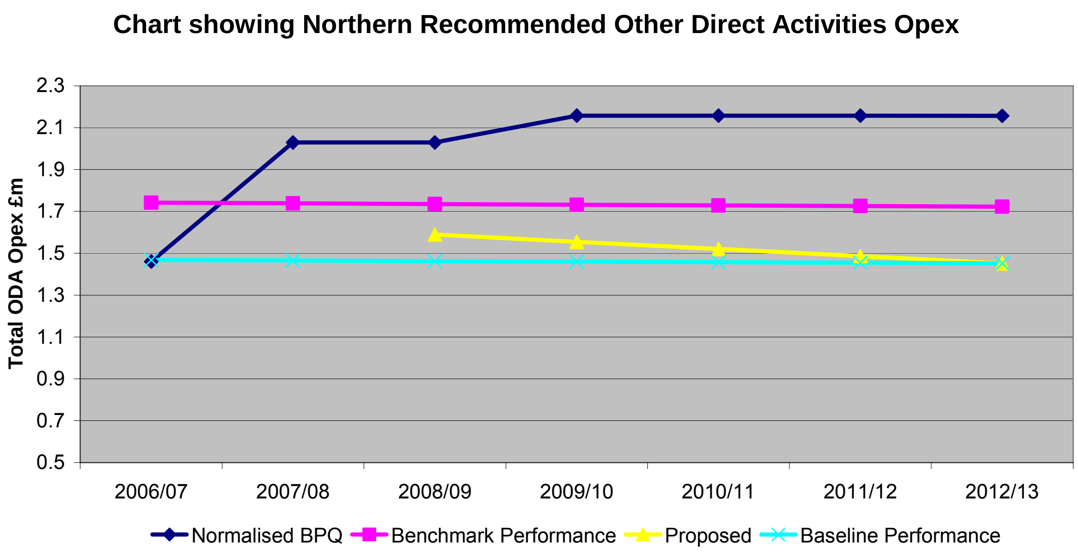

Figure 7-3

Note: the Benchmark and Baseline Performance lines include Adjustments

7.4.6 RECOMMENDATIONS

The recommended final allowances for the review period are summarised in Table 7-1 at the start of this Section.

8 SHRINKAGE

8.1 SUMMARY

Controllable Opex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission	0.0	0.0	0.0	0.0	0.0	**0.0**
Normalisation Adjustments	10.9	11.2	11.6	11.9	12.1	**57.7**
Normalised BPQ	10.9	11.2	11.6	11.9	12.1	**57.7**
Adjustments	0.0	0.0	0.0	0.0	0.0	**0.0**
Proposed	**10.9**	**11.2**	**11.6**	**11.9**	**12.1**	**57.7**

Table 8-1

The normalisation adjustments refer to the transfer of Shrinkage data from work management to a separate category.

8.2 POLICIES & PROCEDURES

Analysis work has been undertaken to understand and comment upon the shrinkage factor and associated components for NGN's networks.

Shrinkage comprises gas lost due to leakage, own use gas and that lost due to theft. The combined total is divided by gas throughput to obtain the shrinkage factor, which is calculated annually for each gas year commencing October 1st. Tables 8.2 and 8.3 show the range of forecast values for the period 2005/06 to 2012/13 for the NorthEast and Northern LDZs respectively.

Factor - NE LDZ	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Leakage factor (%)	0.609	0.597	0.615	0.600	0.587	0.566	0.539	0.512
Own Use factor (%)	0.035	0.011	0.011	0.011	0.011	0.011	0.011	0.011
Theft (%)	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Shrinkage factor (%)	0.664	0.628	0.646	0.632	0.618	0.597	0.571	0.543

Table 8-2

Factor No LDZ	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Leakage factor (%)	0.548	0.526	0.571	0.562	0.542	0.524	0.502	0.478
Own Use factor (%)	0.035	0.011	0.011	0.011	0.011	0.011	0.011	0.011
Theft (%)	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Shrinkage factor (%)	0.603	0.557	0.603	0.593	0.573	0.555	0.534	0.510

Table 8-3

Own use gas (OUG) is almost exclusively for preheating and is under management control; theft is a minor component, agreed annually with shippers. The data indicates that distribution network leakage is the major component at approximately 90-94% of shrinkage, dependant upon year, over the formula period and this component is the focus of our review.

There are a number of interactive factors that influence network shrinkage performance, specifically:

- The Network's policy on average system pressures. Increasing or decreasing pressures impacts leakage performance.
- Gas conditioning by injection of mono ethylene glycol (MEG) into gas supply systems to maintain the condition of CI mains lead yarn joints and minimise leakage.
- The impact of the mains replacement programme, including the methodologies adopted and their effects, on system capacity. Insertion methods may reduce transportation capacity and necessitate reinforcement or pressure increase to ensure the required minimum pressure is maintained throughout the network.
- System reinforcement activity which may lead to reductions in average pressures.
- The drive to reduce methane emissions for environmental reasons.

Network leakage is the calculated loss from the network and is modelled using the National Leakage Reduction Management Model (NLRMM). The model is based on the mains and services leakage rates determined by the 2002 National Leakage Survey.

8.3 HISTORIC PERFORMANCE

Leakage rates for LP systems, MP systems and above ground installations are calculated based on variables such as:

- Pipe materials
- MEG saturation levels
- Average system pressures ,
- Customer numbers
- An allowance for gas lost due to interference damage.

Within the model there is no recognition of any relationship between leakage and public reported escapes as modelling has failed to establish any such linkage.

Average system pressure (ASP) is calculated using standard Network analysis tools and the process is similar for all GDNs. Fig 8.1 shows the ASPs for all networks.

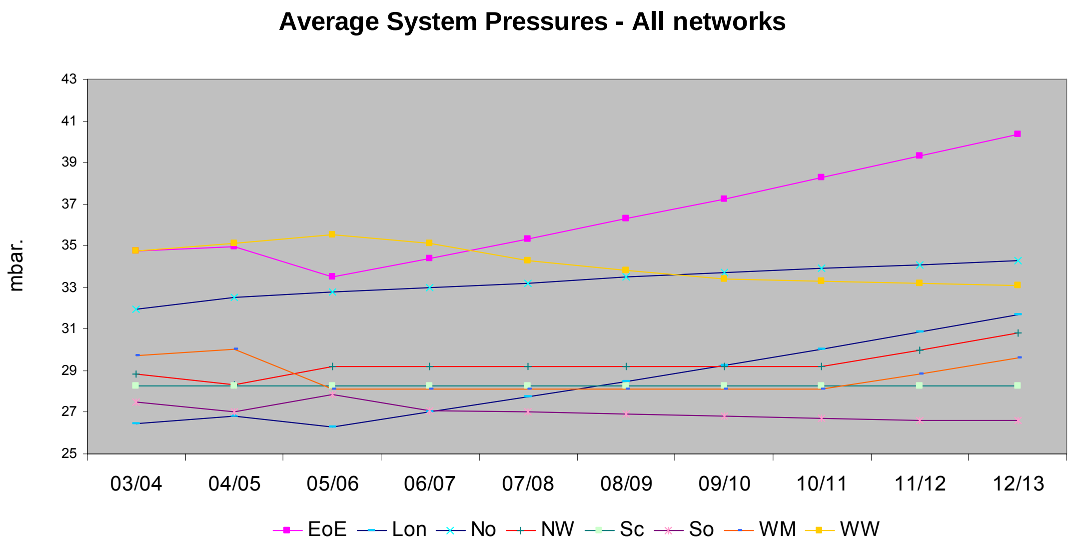

Figure 8-1

8.4 FORECAST

8.4.1 INTRODUCTION

It is to be expected that annual reductions in leakage should be a direct result of the replacement of older, mainly ferrous mains with PE in distribution networks. Generally, the PE leakage rate is of the order of 2% compared to iron mains of a similar size. However, NGN's policy of increasing ASP, both historically and over the review period, increases leakage from the non PE mains asset inventory and offsets gains in system integrity delivered by greater levels of PE. Average system pressure is forecast to increase from 33.5mbar in 2008/09 to 34.3 mbar in 2012/13.

For Northern, using supplied data, gas lost annually due to leakage is forecast to decrease by approximately 5% over the period 2008/09 to 2012/13.

Fig 8.2 shows Northern's trends in gas lost due to leakage (GWh), average system pressures and the proportion of PE mains in the distribution system.

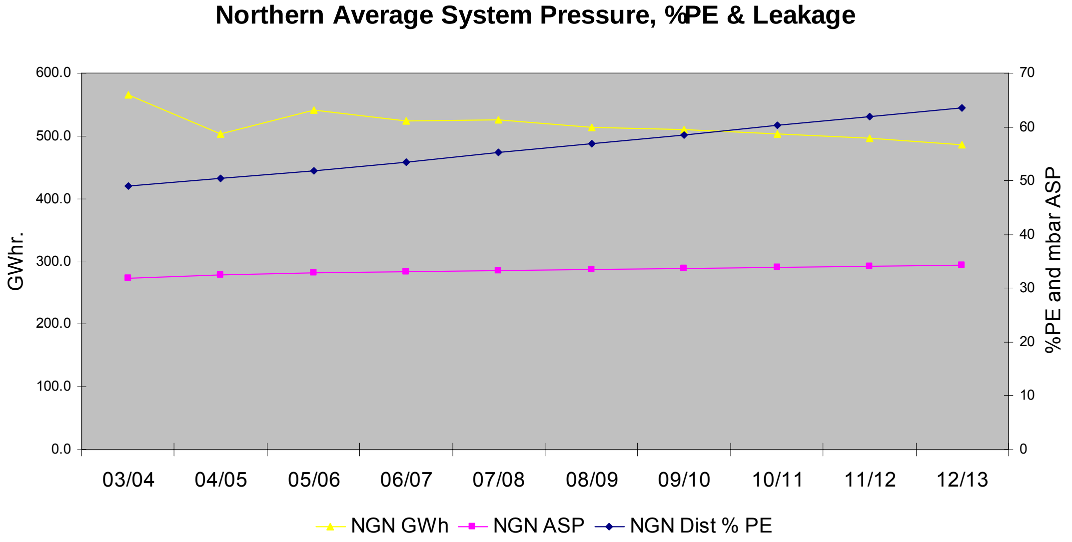

Figure 8-2

The factor used by NGN to determine OUG on the LTS has been agreed with shippers and is based on LDZ throughput. Northern has a sensible programme to update and replace water bath heaters (the main demand for OUG) and associated controls, based on asset condition. This programme will ensure improved efficiency in the use of gas over the coming years, which represents good housekeeping and environmental control. The cost of this work is forecast at £3.6m over five years and is included in Other Operational Capex - Plant and Equipment.

8.4.2 COMPANY PROPOSALS

NGN's shrinkage factor forecasts for the North East LDZ range from 0.632% in 2008/09 to 0.543% in 2012/13, as confirmed by the BPQ submission and summarised in Table 8.2. The range for the Northern LDZ is 0.593% to 0.510%.

8.4.3 PROPOSED PROJECTIONS

We have reviewed NGN's processes for assessing leakage performance and the leakage forecasts for Northern network based on the BPQ narrative response, answers to supplementary questions and numerical analysis. The mains replacement programme results in reduced network leakage but this reduction is offset by increased average system pressure throughout the review period.

We have not identified any significant issues and are satisfied that Northern's forecast shrinkage levels are realistic.

8.5 RECOMMENDATION

We recommend that NGN's forecast for shrinkage levels for the Northern network is accepted.

9 XOSERVE

9.1 SUMMARY

Controllable Opex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission	0.0	0.0	0.0	0.0	0.0	**0.0**
Normalisation Adjustments	3.2	3.3	3.2	3.2	3.3	**16.2**
Normalised BPQ	3.2	3.3	3.2	3.2	3.3	**16.2**
Adjustments	0.0	0.0	0.0	0.0	0.0	**0.0**
Proposed	**3.2**	**3.3**	**3.2**	**3.2**	**3.3**	**16.2**

Table 9-1

9.2 BACKGROUND

xoserve is a separate business which started trading on 1st May 2005 as a wholly owned subsidiary of National Grid Group. On 1st June it became multi-owned by the GDN's and National Grid UK Transmission. The shareholding is split amongst National Grid NTS (11%) and all the GDNs in proportion to the number of supply points in March 2005.

xoserve provides transactional services primarily through UK LINK, as well as IS Support and Change Management to the GDNs under an Agency Services Agreement (ASA).

The staffing of xoserve has been drawn mainly from staff transferred from the National Grid Gas business at the time of the creation of xoserve. The company has a board of six directors drawn from five owners.

xoserve claims to draw benefit from its close association with National Grid, using the main National Grid contracts where this is deemed to provide benefit to the business. A major part of this relationship is the provision of IS services via the Computer Sciences Corporation (CSC) contract which runs National Grid's mainframe, application server, desktop, help desk and telecommunications services.

9.3 KEY CHALLENGES

xoserve is planning a series of significant capital development projects in the next period, including a rewrite of UK-LINK. These projects are fundamental to the successful delivery of the xoserve services which in turn are supporting the competitive gas market. Xoserve have had comprehensive studies on the feasibility and analysis of these projects. We do not challenge the need or approach to these projects.

Project based work during the next formula period will be a major influence on the activities of xoserve and its management team. They estimate 60 of their staff will be deployed on these projects. It is clear that while the systems are operating satisfactorily at present, the xoserve are concerned that this project is delivered within these timescales to eliminate potential risks associated with the performance of the current systems.

The first of these major projects will be the replacement of the technology on which the UK-Link application runs, and is planned during 2007-2008. The second and larger project is the rewrite of the UK-Link systems planned for activity 2009-2013.

9.4 NORMAL OPERATIONS

In addition to supporting the IS application systems such as UK-Link xoserve also provide day-to-day clerical support activities on behalf of the GDNs, primarily to Shipper companies. Whilst some of these activities are provided in-house by xoserve, others such as the M-Number bureau are sub-contracted back to National Grid.

From the information presented in the BPQ and subsequently in the visit, we believe that the current management team are actively managing the contracts with all there suppliers (including National Grid) in order to maximise delivery and minimise cost.

Whilst this situation is currently commendable we would expect to see more formal targets to reduce costs and increase performance directly introduced from the xoserve board over the longer period of the price control. We are not suggesting such targets should be more onerous than those currently being applied, rather that the targets such be set on a more formal basis.

Further, more mechanisms must be considered which encourage the xoserve team to put forward innovative options to reduce costs. An example of this evidenced in the study was minimising the number of M-number calls the operation must deal with by making information available to the appropriate audience (for example by the internet) and thus reducing the number of calls for this service. These initiatives and opportunities are more likely to be spotted from within xoserve than from the GDNs and there must be rewards to xoserve for identifying and promoting such savings.

9.5 ONGOING COSTS

Table 9.1 summarises the situation with London xoserve Opex costs, which were submitted as part of the work management submission and have been moved into a separate category.

To date the GDNs have treated xoserve charges as Opex - although some (NGG and WWU) have submitted elements of Capex in their forecast costs. PB Power are therefore reviewing and, where necessary, adjusting the Opex/Capex split for each GDN.

They are piloting a six sigma quality programme for the next level of improvement this programme is aimed specifically at improving the quality of the service rather than cost reduction.

xoserve has restructured itself since its establishment into Service Development, Service Operations and Planning. They do expect some efficiency to be gained as a result. They have forecast a reduction in there total headcount of from 267 in 2005/06 to 216 in 2012/13 a 19.1% reduction (18.8% if agency staff are taken into account).

There is a step change in the cost forecasts for 2006/07 compared with 2005/06 actual expenditure as xoserve state the 2005/06 figure where atypical due to the nature of the formation of the business. We believe the opportunity to review the 2006/07 actual expenditure will provide more robust basis for assessing the ongoing costs. We note that the forecast used by xoserve assumes staff costs rising by 2% compared to the 1% we have used in our review. However we note that such an adjustment would be less 0.1% of the total expenditure and therefore we have not at this stage (prior to the 2006/07 actual expenditure being available) made any adjustment.

9.6 TREATMENT OF COSTS

The following table shows how NGN has submitted its total xoserve costs, split between Opex and Capex, alongside the equivalent figures which xoserve has submitted for its anticipated turnover from NGN.

Northern	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	Total shown	5year total
Opex	3.10	3.70	3.90	5.10	3.40	5.20	4.80	3.40	3.40	36.00	21.90
Capex	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.10	3.70	3.90	5.10	3.40	5.20	4.80	3.40	3.40	36.00	21.90
xoserve turnover	2.95	3.75	3.91	5.13	3.39	5.22	4.76	3.36	4.41	36.87	21.86
Difference	-0.15	0.05	0.01	0.03	-0.01	0.02	-0.04	-0.04	1.01	0.87	-0.04

Table 9-2

For all GDNs, the amount they anticipate being charged is the same (within rounding errors) as the turnover xoserve expects to receive.

However, we believe that NGN should be allocating some of their expenditure to Capex. Since the costs relate to capital projects which xoserve intend to charge in the year in which they are incurred, we believe it is appropriate that an element of each GDN's total xoserve costs should be allocated as Capex. This applies from 2006/2007, when the first project Capex is scheduled to be incurred.

In the case of WWU and the NGG GDN's we have verified that the Opex/Capex split is such that the Capex allocation reflects their proportionate shareholding in xoserve and hence their appropriate share of the costs allocated to them. We have used this approach to estimate appropriate Capex allocations for those GDN's who have not charged some of their xoserve costs to Capex.

This calculation is set out for NGN below:-

Shareholding Allocations	%	%
National Grid	56.57	45.57
South	16.05	16.05
Scotland	6.97	6.97
Northern	10.38	10.38
Wales & West	10.03	10.03
NTS	-	11.00
Total	100	100

Table 9-3

NGN's shareholding in xoserve is 10.38%.

Ratio Calculation	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
NG Capex	0.00	0.60	2.90	8.30	0.60	8.70	6.90	0.60
WW Capex	0.00	0.13	0.61	1.82	0.15	1.93	1.50	0.15
NG Ratio	0.00	0.013	0.064	0.182	0.013	0.191	0.151	0.013
WW Ratio	0.00	0.013	0.061	0.181	0.015	0.192	0.149	0.015
Average	0.00	0.01	0.06	0.18	0.01	0.19	0.15	0.01

Table 9-4

Applying the average ratio for each year (from table 7.9) to the NGN Shareholding allocation gives the following:

Northern	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	5year total
Submitted Opex	3.10	3.70	3.90	5.10	3.40	5.20	4.80	3.40	21.90
Submitted Capex	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.10	3.70	3.90	5.10	3.40	5.20	4.80	3.40	21.90
Calculated Capex	0.00	0.13	0.65	1.89	0.15	1.99	1.56	0.15	5.73
Calculated Opex	3.10	3.57	3.25	3.21	3.25	3.21	3.24	3.25	16.17
Adjustment	0.00	-0.13	-0.65	-1.89	-0.15	-1.99	-1.56	-0.15	-5.73

Table 9-5

We therefore propose a normalisation adjustment of £5.73m for the period should be added to NGN's Non-Operational Capex, and a corresponding amount to be taken from their xoserve Opex (ref Capex report section 7). Please note that this table also shows the calculation of the same adjustment for the years 2006/07 and 2007/08, totalling £0.78m to be transferred to Capex from Opex. This is shown in table 9.1 in the historical performance section.

APPENDIX 1 FINANCIAL & TECHNICAL POLICIES

A1.1 INTRODUCTION

This section reviews the financial and Technical framework under which Northern Gas Networks operate, the structure it utilises to effectively manage their assets and the key policies it adopts to ensure it meets its Statutory Licence obligations and other legislative requirements.

A1.2 APPROACH

The key policies used by the Network have been reviewed and where appropriate comments are made on our findings.

- **Purpose** -- This sets the context of the Policy under review, how it fits with legal requirements and its financial impact.
- **Appropriateness** -- The policy is considered for its appropriateness; does it deliver the required outcomes, are financial and/or technical risks adequately managed and does it fit with the Statutory and legal requirements of the Network owner/operator.
- **Safety and Environment** – Does the Policy deal with the safety and environmental risks generated by the assets continued operation. Are these risk clearly understood and documented.
- **Omissions and Improvements** – Outlines any improvements or omissions required of the policy for it to fully meet its declared objectives
- **Implementation** – Has the Policy been written in a way that provides clarity of understanding and consistency of implementation?

The review of policies and procedures for this appendix is not implied to be a full and comprehensive review process which could only be achieved via structured audit programme. The objective is to consider whether the high level objectives of the policy are met and that the content is fit for purpose.

A1.3 FINANCIAL AND TECHNICAL FRAMEWORK

NGN has implemented a business model based on the principles of Strategic Asset Management. Under this model, the roles of asset ownership, asset management and asset services are unbundled with NGN as holder of the Transporters License and Safety Case as well as retaining ownership of the key operational systems relating to the operation and maintenance of the network. NGN has outsourced to United Utilities Operations Ltd. (UUOL) a range of activities previously undertaken within the Network. These predominantly relate to the operation and maintenance of the distribution network and the delivery of capital and mains replacement programmes. The appointment of UUOL was carried out via a competitive tender process. The relationship between NGN and UUOL is governed by an Asset Services Agreement. (ASA)

The key policies and activities of NGN are driven by the legal and regulatory framework in which it sees itself operating. They describe the four principle components of this framework as; the Gas Act; Gas Transporter License; Uniform Network Code; and the Gas Safety Regime.

The principle duties of NGN are set out in Section 9 of the Gas Act. In summary these duties are to:

- Develop and maintain an efficient and economical pipeline system for the conveyance of gas across the network;
- Complying so far as economical to do so with reasonable requests to connect to the system and convey gas by means of that system to any premises;

- Facilitate competition in the supply of gas; and
- Avoid any undue preference or undue discrimination in the connection of premises or other pipelines or in the terms on which it undertakes the conveyance of gas.

Under the Gas Act NGN are required to hold a Gas Transporter licence. Two key obligations of this licence require NGN to;

- have a network code which sets out the transportation arrangements between NGN, the NTS, other DN's and gas shippers for connection to and use of its pipeline system; and
- maintain security standards for system development. This standard stipulates that the pipeline system must be capable of meeting peak aggregate daily demand that is only likely to be exceeded (whether on one or more days) in 1 year out of 20 years

The Gas Safety (Management) Regulations 1996 require NGN to prepare a Safety Case for acceptance by the Health and Safety Executive. Compliance with their approved safety case is mandatory and the NGN Gas Requirements Manual (GRM) is a depository of the policies and procedures they use to ensure that NGN fulfils its safety obligations, complies with their Transporter Licence and delivers the arrangements necessary to comply with the Safety Case.

An overview of the technical and financial framework within the Network is shown in the diagram below.

Financial and Technical Framework

Board Level	
Statutory, legal and regulatory requirements	
Financial	Technical
Investment Guidelines	
Budgeting process	Safety Case
Project definition, alternatives etc.	Gas Requirements Manual
Levels of authority	Safety & Technical Competence
Monitoring & control	Policies and Procedures
Re-authorisation of over/underspends	Change Process & authorisation
Project completion	Compliance Audit
PIAs	

The key requirement of this framework is for the Board of NGN to structure and operate the business such that they comply with the statutory, legal and regulatory obligations placed upon them.

A1.3.1 TECHNICAL POLICY FRAMEWORK

The Gas Requirements Manual (GRM) defines the policies used for the engineering of the Network assets, the protection of the public, the well being of their workforce and contractors and the protection of the environment. It is put forward as the key reference document referenced by managers and staff involved in gas engineering activities. The GRM along with the Safety Case describes what they do and how they operate to achieve a safe and reliable gas transportation network.

The GRM covers the following areas:

1. Legislative Compliance	12. Gas Quality
2. Risk Management	13. Metering
3. Control of Documents	14. Incident Reporting and Investigation
4. Change Management	15. Network Planning Analysis
5. Technical Authority Levels: Competence and Behaviour	16. Records Data Management
6. Safe Working Practices and Safe Control of Operations	17. Network Asset Integrity
7. Environment	18. Distribution Pipe Replacement
8. Occupational Health	19. LNG
9. Use of Contractors	20. Audit
10. Gas Escapes	21. Security
11. Gas Supply Emergencies	22. Telemetry

NGN have confirmed that they are still using the NGG version of the GRM but that they are currently developing their own version of this document.

A1.4 POLICY DEVELOPMENT AND CONTROL

Within NGN, engineering and SHE documents are developed and approved within a governance framework which is headed by the Gas Networks Safety and Engineering Committee (GNSEC).

GNSEC comprises of business functional directors including the relevant DN Senior Managers.

[Sec 4.a12 Safety Case]

NGN operate a HS&E governance Group as well as the GNSEC. The GNSEC reports to the NGN Board and the HS&E governance group report to the NGN Executive. Both have close links in the development and control of policy documents.

We believe that NGN are conducting a general review of their P&P’s since taking ownership. It is evident however that the majority of P&P’s currently in place are those handed over by NG at the point of sale. Where changes are determined as necessary the process is governed by the Gas Requirements Manual Sec 3 Control of Documents and Sec 4 Change Management.

The detailed processes used by NGN in this context can be found in the Management Procedure NGN/PM/GR/2: Management Procedure for the Control of SHE and engineering Documents.

In answer to BPQ 6.144 NGN indicate that they are currently developing procedures based on the principals of PAS55. No timescale is provided for this change to take place.

A1.5 FINANCIAL POLICY FRAMEWORK

The improvement, addition, replacement or maintenance of the Network assets is governed by the Investment Procedures/Guidelines. This sets out how Operational expenditure and capital investment are authorized, controlled, monitored and audited. The Network Policy for Capital Expenditure (and Acquisitions) is set out in Document PFIN007 (Appendix 6.149 1 yr returns)

This document sets out, at a high level, the key financial controls that govern the investment cycle of NGN Ltd. The overall responsibility for ensuring that capital expenditure is both controlled and spent in the most effective manner lies with the Capital Investment Committee (CIC), supported by the Finance department.

Membership of the Capital Investment Committee comprises:

- Chief Executive Officer
- Finance Director
- Head of Network

and, by invitation, Heads of Department and Project Managers (as required.)

Below the Capital Investment Committee the Investment Screening Group (ISG) of NGN

receive all business case submissions for authorisation/sanction of services performed under

the Asset Services Agreement (ASA) between NGN and UUOL (see general description above)

- Members of the NGN ISG are
- Finance Director, NGN (Chair)
- Network Director, NGN
- Chief Operating Officer, UUOL
- Head of Finance, UUOL
- Head of Operations, UUOL
- Chief Accountant, UUOL

Delegated authority levels are defined and documented within the Network Investment Procedures as are the details for project monitoring and post investment appraisel.

A1.6 FINDINGS

A1.6.1 ENGINEERING AND SAFETY POLICY DOCUMENTS

The various levels of engineering and safety documents together with the associated governance arrangements have been reviewed and subject to the point below, no issues have been found.

As stated in A 1.3 above, NGN are currently developing their version of the Gas Requirements Manual. Until this is done they continue to use the National Grid version which was handed over to Networks at the time of sale.

As the GRM is a prime document which details how, amongst other things, the Networks complies with its Safety Case requirements, we believe this document should be completed and agreed as soon as is reasonably practicable and that a timetable should be set out for the completion of this action.

A1.6.2 TECHNICAL FRAMEWORK

There is clear evidence of a formal and well documented Technical governance process within NGN. Directors and Senior Managers are involved in the major governance groups reviewing and authorising safety, health, environmental and engineering policies. Arrangements are in place to review the impact of changes to legislative requirements and, importantly, to learn lessons from incidents or near misses should they occur.

There are a number of references within various NGN documents that relate to legacy policies and procedures taken directly from the original National Grid Transco suite of policies. Documents in use within NGN have, in a large number of instances, been re-badged, but at this time, other than basic editing, little has been done to review the detailed contents of policies to ensure that;

- they are appropriate and consistent with the NGN structure and governance processes
- they are individually signed off as an approved NGN P&P

We believe the Network has embarked on a programme of review of the legacy documents currently in use. (Response to 6.12 One year review) and whilst it is acknowledged that significant other priorities exist at this time feel that a clear timetable should be set out for this process of review and update. The point made in A 1.6.1 above regarding the GRM in use applies in this section also.

Subject to the above minor issues we believe the technical framework for the formulation, implementation and review of SHE and engineering policies and procedures within Northern Gas Networks to be consistent with the sound engineering management and operation of a gas distribution network.

A1.6.3 FINANCIAL FRAMEWORK

The documents reviewed show a clear process for budget formulation and approval, financial control and monitoring of investment expenditure. We have found nothing to suggest that the Financial framework within NGN is not consistent with that required within a major company.

APPENDIX 2 PROCUREMENT & LOGISTICS

A2.1 INTRODUCTION

Following on from the one year review a further review and assessment of the procurement and logistics operation within NGN has been completed to ascertain whether or not the strategic approach and process is robust and effective in managing costs whilst maintaining security of supply.

Since the sell off of the Networks by National Grid, the new networks including NGN have a different market place in which to procure goods, services and works to support their business. There is no longer the advantage of large volume and single buyer status, so it is therefore crucial for the Network Companies to look for ways through procurement and logistics to obtain the best market solution possible for their particular needs and minimize costs.

A2.2 SOURCING STRATEGY

NGN outsource their Procurement to United Utilities Operations Ltd. By using UUOL they are able to procure on behalf of the group and therefore use their larger volumes as leverage when going out to the market a good example of this is their PE contract.

A2.3 STRATEGIC PURCHASES

A2.3.1 MAINS AND SERVICE LAYING

NGN through UUOL have now entered into one collaborative partnership (Balfour Beatty/Morgan Est) which has 3 delivery contractors, Balfour Beatty, Morgan Est and Enterprise.

The contract is based on an Actual versus Target Cost, Shared Risk and Reward Model. The contract strategy demonstrates several opportunities to reduce costs. Due to the length of time that this contract has been in place there is not measurable cost information available at this time, so it is therefore not possible to understand whether or not the strategy adopted has been successful from a financial perspective.

NGN have stated that they will have incurred exceptional costs this year during the handover and mobilisation period. These costs have not been specifically identified and should only be one offs.

The principles of the contract should result in cost reduction and continuous improvement.

A2.3.2 CONNECTIONS

NGN through UUOL has entered into a partnership contract with a subsidiary of UUOL.

The procurement process detailed in the evidence provided demonstrates that a thorough process was undertaken. The contract in place is an actual versus Target Cost, Shared Risk and Reward model. The requirements of the contract and the way it is designed to operate if successful should be cost effective and incentivise the contractor and NGN to continuously improve and reduce costs.

A2.3.3 BULK PURCHASES

Specific information was requested with regard to the purchase of vehicles, Telecoms, Office Security, Furniture and Tools & Equipment. NGN stated that all purchases are subject to UU's purchasing procedures but no specific details have been provided relating to the status of the bulk purchases that were specifically referred to in the question, therefore no comment can be made on the cost effectiveness of these purchases.

A2.4 SECURITY OF SUPPLY

NGN appear to have a robust set of contingencies in place for out of stock situations.

NGN carry stock of smaller items in their Network and maintain levels based on historical usage and therefore have a buffer stock so they can react if the items are not available from the supplier. If an item is out of stock they look for an alternative where there is flexibility between types of approved fittings.

Many large Capex and Repex projects are planned months in advance and so there is the potential to plan work around difficult lead times, use other suppliers or in the worst case redesign.

There are also collaboration arrangements in place between the DNs to maintain certain high value strategic items on a national basis.

A2.5 LABOUR SHORTAGES

NGN are proactive in trying to address the skilled labour shortages in the industry. They are converting contract first call operatives and contractor mates (GD1s) into direct labour. They have also put long term agreements in place with their contractors to allow for investment in training.

A2.6 SUMMARY

NGN have provided evidence that demonstrates that they have a good procurement and logistics process via their Assets Service Agreement with UUOL and their logistics provider NRG2.

The contracts set up by UUOL have KPIs and targets that mirror the ASA that UUOL have with NGN therefore supporting UUOL to meet their targets through the supply chain and ultimately meet the objectives of NGN.

Due to their Group purchasing power they have an advantage in the market place for a high percentage of their strategic, high volume, and/or high value purchases and should therefore be able to buy competitively. Their strategies for both Connections and Mains & Service laying contracts demonstrate positive principles that can work if the contracts are managed effectively.

APPENDIX 3 EMERGENCY SERVICE COSTS AND THE IMPACT OF THE LOSS OF METERWORK

[Appendix redacted]

APPENDIX 4 GTMS/SOMSA EXIT PLANS

A4.1 INTRODUCTION

In February 2003, NG announced a 2-year program of Gas Distribution Control centralisation from 4 centres into a single UK control centre at Hinckley. The activity was to be carried out as part of the Control Centre Development Project (CCDP) an encompassing program that moved the gas national control centre to a new purpose built facility in Warwick.

The Distribution National Control Centre (DNCC) was opened in summer 2005 with full UK gas distribution control undertaken from Hinckley.

The Gas Transportation Management System (GTMS) is the Supervisory Control & Data Acquisition (SCADA) System that Controls the combined UK Distribution Networks. Originally, the System was to be replaced as a part of the roll out of the Transmission Control System; the iGMS project. However, a new iGMS for Distribution Control was removed from the program. The logic of the curtailment was entirely due to a change in focus of the NG business. Originally seen as a fully integrated system involving UK gas control, the company faced business separation issues as a result of Network sales, which rendered iGMS, for distribution, as an unfeasible option.

Given the backdrop of the issues of business separation the decision was then taken to alter the business ownership of DNCC moving management responsibility to Distribution, Network Strategy. The function of Distribution control is performed from Hinckley, which is wholly owned and operated by National Grid, with an agreement to operationally service all independent networks under a contract. That contract, known as SOMSA – System Operation Managed Service Agreement – is for all Operating services required for any given network.

A4.2 GMTS REPLACEMENT

GTMS is old technology based upon a Logica system dating from the mid 1980's. The System has been enhanced in house by NG over the years since its inception and has been used in its current form since 1996. However, one of the drivers for iGMS was the age of the GTMS product. GTMS spares availability is limited and there are issues of unsupported software by the manufacturer. NG undertook and completed work to establish the viability of continued running & support; the outcome was that it was considered unsustainable beyond 2009 and that a new System must be sought as a matter of some urgency. Investigation was undertaken into the possibly of moving the system to new computer hardware. Unfortunately, GTMS programmes are also embedded into the Operating System; a system that is not supported by the manufacturer.

A project was therefore established to keep GTMS functioning until 2009, the Prolonged Active Life (PAL) and a second project to replace GTMS was given approval in autumn 2005. Work was undertaken to provide a replacement specification on a modern platform, put the specification to market and engage a suitable contractor. After some 10 months of work SERCK controls was chosen from a shortlist of 4 companies.

The Distribution National Control System (DNCS) Project aims to replace GTMS with a like for like System but on a modern and sustainable platform and at the least possible cost to the industry as a whole.

A4.3 NETWORK SALES

The sale of distribution networks had a profound effect on gas distribution control for all parties, Distribution Networks and Control staff.

It was clear at the outset that given the safety elements associated with gas control and the difficulties to unpick control operations that handling distribution control for the newly formed businesses would be extremely difficult. An agreement (contract) was developed, referred to earlier as SOMSA. A team was established at Hinckley who constructed, trained staff on and issued industry standard procedures for use by Network and control staff alike. The agreements were established between NGG and all other network owners. However, the SOMSA has always had a finite lifespan and a clear condition of the sale was that control should pass to the new owners. The costs associated with this transfer being factored into the sales process. To allow for the planning of the transfer post sales, Ofgem allowed a relinquishment of operational control for an initial period until March 2008, with the possibility of an extension beyond this stage subject to clear exit planning.

The agreement includes the provision of data and access to Systems to facilitate the transfer of control; however, it specifically excludes the provision of a SCADA System.

A4.4 AGREEMENT TO WORK TOGETHER

Following sales all owners reviewed the options for the provision of a new SCADA system to enable control to be passed back to the new owners. The owners all came to the conclusion that a collaborative approach to replacing the GTMS was the best way forward. Having considered the options available we would support this approach, although risk management is essential to ensure such a collaborative approach does not have difficulties in management and decision-making. It can be stated that we feel some of the risk factors are mitigated by a like for like arrangement in that the specification will be clear.

The approach was to replace the system, initially at Hinckley, and once proved robust further phases would establish the same system at the new owner locations and transfer from Hinckley would then be made.

A governance process has been adopted with an overarching program board to cover all activities associated with SOMSA exit of which GTMS replacement was one of several activities and has it’s own project board and governance.

It is clear from the governance structure that SOMSA Exit is the goal with GTMS replacement as an enabler.

Network Owners need to provide their own project management delivery organisation to dovetail into the collaborative project.

Each owner has expressed a wish to exit. Early indications are a timetable as follows:

- Summer 2008 SGN
- Spring 2009 NGN
- Autumn 2009 WWU

However, there are no detailed transfer plans in place with NG for the transfer of operation. The owners continue to jointly work together to identify and understand the exact extent of the activities that would have to be completed by all participants.

APPENDIX 5 REGIONAL FACTORS

A5.1 BCIS REGIONAL & COUNTY FACTORS

The Regional and County Factors is published by BCIS, a trading Division of the Royal Institute of Chartered Surveyors (RICS). The figures published in October 2006 have been adapted in order to generate a suitable regional factor index for each GDN for comparison purposes for the review.

The county indices have been modified to remove Orkney Islands Area, Shetland Islands, Northern Ireland and the Channel Islands from the figures. Counties have been allocated to GDNs and where they fall between two GDNs and estimate of the spilt between the GDNs has been made.

The table below lists the Counties which have been split between GDNs and the allocation which has been assumed for each GDN.

COUNTY	WW	No	So	EoE	Lon	NW	WM
Cumbria		70%				30%	
South Yorkshire		50%		50%			
Essex				70%	30%		
Hertfordshire				90%	10%		
Berkshire			75%		25%		
Buckinghamshire			75%		25%		
London Postal Districts			50%		50%		
Outer London			35%	30%	35%		
Hereford and Worcester	20%						80%
Cheshire						80%	20%

Table A5 - 1

The regional factor for the GDN is calculated as a weighted average of the total county factors based on the sample sizes. The BCIS data includes a sample size for each county together with the factor for that county. Where the Counties are considered to fall into one or more GDN footprint we have estimated the proportion of the County sample which should be allocated to each GDN. (For example the sample size for London Postal Districts in the BCIS data is 528, we have estimate that this County should be split 50% to each of London and Southern GDNs, therefore sample sizes of 264 have been allocated to each GDN)

For each GDN a weighted average factor is then calculated. The resulting tables used to produce the GDN indices are given below.

Wales & West	Network/ County Factor	Sample Size
Avon	1.02	92.0
Cornwall	0.99	103.0
Devon	0.99	163.0
Gloucestershire	1.02	73.0
Somerset	0.99	74.0
Hereford and Worcester	0.94	23.8
Clwyd	0.87	50.0
Dyfed	0.94	36.0
Gwent	0.92	52.0
Gwynedd	0.89	23.0
Mid Glamorgan	0.91	54.0
POWYS	0.90	23.0
South Glamorgan	0.93	46.0
West Glamorgan	0.89	31.0
Network Value	**0.96**	**843.8**

Table A5 - 2

Northern	Network/ County Factor	Sample Size
Cleveland	1.02	62.0
Cumbria	1.05	44.1
Durham	1.01	113.0
Northumberland	1.04	46.0
Tyne Wear	1.01	172.0
Humberside	1.00	104.0
North Yorkshire	1.03	92.0
South Yorkshire	1.01	63.5
West Yorkshire	1.00	212.0
Network Value	**1.01**	**908.6**

Table A5 - 3

Scotland	Network/ County Factor	Sample Size
Borders Scotland	0.99	18.0
Central Scotland	0.98	32.0
Dumfries & Galloway	0.93	23.0
Fife	0.96	62.0
Grampian	0.90	134.0
Highland	0.93	42.0
Lothian	1.02	131.0
Strathclyde	1.03	363.0
Tayside	0.98	85.0
Network Value	**0.99**	**890.0**

Table A5 - 4

Southern	Network/ County Factor	Sample Size
Kent	1.05	215.0
Surrey	1.10	151.0
East Sussex	1.05	119.0
West Sussex	1.04	118.0
Berkshire	1.04	100.5
Buckinghamshire	1.03	135.8
Hampshire	1.01	293.0
Isle of Wight	1.00	18.0
Oxfordshire	0.99	104.0
London Postal Districts	1.18	264.0
Outer London	1.10	112.0
Dorset	1.02	96.0
Wiltshire	1.01	94.0
Network Value	**1.06**	**1820.3**

Table A5 - 5

East of England	Network/ County Factor	Sample Size
South Yorkshire	1.01	63.5
Derbyshlre	0.94	120.0
Leicestershire	0.94	92.0
Lincolnshire	0.94	81.0
Northamptonshire	1.00	123.0
Nottinghamshire	0.93	135.0
Cambridgeshire	1.04	185.0
Norfolk	0.98	102.0
Suffolk	1.01	109.0
Bedfordshire	1.02	71.0
Essex	1.02	152.6
Hertfordshire	1.06	117.0
Outer London	1.10	96.0
Network Value	**1.00**	**1447.1**

Table A5 - 6

London	Network/ County Factor	Sample Size
Essex	1.02	65.4
Hertfordshire	1.06	13.0
Berkshire	1.04	33.5
Buckinghamshire	1.03	45.3
London Postal Districts	1.18	264.0
Outer London	1.10	112.0
Network Value	**1.11**	**533.2**

Table A5 - 7

North West	Network/ County Factor	Sample Size
Cumbria	1.05	18.9
Cheshire	0.92	127.2
Greater Manchester	0.93	297.0
Lancashire	0.93	167.0
Merseyside	0.94	175.0
Network Value	**0.93**	**785.1**

Table A5 - 8

West Midlands	Network/ County Factor	Sample Size
Hereford and Worcester	0.94	95.2
Shropshire	0.93	79.0
Staffordshire	0.91	133.0
Warwickshire	0.96	96.0
West Midlands	0.94	318.0
Cheshire	0.92	31.8
Network Value	**0.94**	**753.0**

Table A5 - 9

APPENDIX 6 RE-ALLOCATIONS

A6.1 INTRODUCTION

In late January 2007, following our initial work to normalise and then analyse GDNs' cost data it became apparent from the analysis that there was still a considerable amount of inconsistent cost allocation issues for direct Opex activities which needed to be resolved. We requested further detail from the networks to enable us to ensure consistency between the submissions and to assist Ofgem in refining the guidance for the update BPQ that is due to be issued to capture 2006-07 actual expenditure and revised forecasts.

This was completed as a two stage process which helped minimise the volume of data required to be submitted. The first stage involved the completion of a workbook which broke down the key direct Opex activities within the 7 areas of expenditure. For each of the 7 areas the network was asked to select where each expense item/sub-activity had been allocated.

Following these initial replies further details were requested in the areas where inconsistent allocation had been identified. The results of this re-allocation, details of which are set out in Table 6-A-1 were used for our analysis at the time. Additional information became available in March 2007, which has been incorporated into the most recent analysis presented in this report.

A6.2 RE-ALLOCATION RESULTS

The table below documents the information passed back from NGG as a result of the reallocation process.

Northern Network Re-allocation details £m 2005/06 prices	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Work Management	**-0.91**	**-1.28**	**-1.33**	**-1.35**	**-1.33**	**-1.31**	**-1.32**	**-1.33**	**-10.17**
NRSWA penalties	0.20	0.10	0.20	0.20	0.20	0.20	0.20	0.20	1.50
Calorimeter calibration (NSA for some GDNs)	0.20	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.34
Reinstatement (staff costs)	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-2.40
Non Salary Staff costs (Repairs)	-0.35	-0.43	-0.45	-0.45	-0.45	-0.45	-0.44	-0.45	-3.47
Non salary staff costs (Emergency)	-0.32	-0.40	-0.44	-0.44	-0.43	-0.42	-0.43	-0.44	-3.31
Non Salary Staff Costs (maintenance LTS)	-0.06	-0.08	-0.09	-0.09	-0.08	-0.08	-0.08	-0.08	-0.64
Non Salary Staff Costs (maintenance storage)	-0.03	-0.04	-0.04	-0.04	-0.03	-0.03	-0.03	-0.04	-0.28
Non Salary Staff Costs (maintenance other)	-0.24	-0.26	-0.22	-0.23	-0.22	-0.22	-0.22	-0.22	-1.82
Non Salary Staff Costs (Other direct)	-0.01	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.08
Repair	**0.05**	**0.33**	**0.25**	**0.25**	**0.25**	**0.25**	**0.24**	**0.25**	**1.87**
Repair NRSWA Costs	-0.20	-0.10	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-1.50
Reinstatement (staff costs)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	2.40
Reinstatement (inspections)	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.80
Non Salary Staff costs (Repairs)	0.35	0.43	0.45	0.45	0.45	0.45	0.44	0.45	3.47
Leakage control surveys	-0.30	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-1.70
Emergency	**0.32**	**0.40**	**0.44**	**0.44**	**0.43**	**0.42**	**0.43**	**0.44**	**3.31**
Non salary staff costs (Emergency)	0.32	0.40	0.44	0.44	0.43	0.42	0.43	0.44	3.31
Maintenance LTS	**0.36**	**0.38**	**0.39**	**0.39**	**0.38**	**0.38**	**0.38**	**0.38**	**3.04**
Sub-contractors CP Remediation	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	2.40
Non Salary Staff Costs (maintenance LTS)	0.06	0.08	0.09	0.09	0.08	0.08	0.08	0.08	0.64
Maintenance Storage	**0.03**	**0.04**	**0.04**	**0.04**	**0.03**	**0.03**	**0.03**	**0.04**	**0.28**
Non Salary Staff Costs (maintenance storage)	0.03	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.28
Maintenance Other	**0.04**	**0.26**	**0.22**	**0.23**	**0.22**	**0.22**	**0.22**	**0.22**	**1.62**
Non Salary Staff Costs (maintenance other)	0.24	0.26	0.22	0.23	0.22	0.22	0.22	0.22	1.82
Compensation for supply interuptions (GS&OS)	-0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.20
Other Direct	**0.11**	**-0.14**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.04**
Reinstatement (inspections)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.80
Cathodic protection remediation	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-2.40
Compensation for supply interruptions (GS&OS)	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Non Salary Staff Costs (Other direct)	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.08

Calorimeter calibration (NSA for some GDNs)	-0.20	-0.14	0.00	0.00	0.00	0.00	0.00	0.00	-0.34
Leakage control surveys	0.30	0.20	0.20	0.20	0.20	0.20	0.20	0.20	1.70
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6A - 1

APPENDIX 7 DATA TABLES & REGRESSION

A7.1 INTRODUCTION

Much of the data entered into the BPQs submitted in October 2006 has been transferred to a database format within Microsoft Excel.

The format allows the data to be manipulated in a number of ways to enable PB Power to determine the appropriate analysis mechanism for each activity.

The sections below give explanations and worked examples of the data calculations use on our analysis.

A7.1.1 ANALYSIS USED

There are three principal forms of analysis which have been carried out to make the projections for our proposals.

The first uses regression analysis to carry out comparisons between the costs and workloads of each GDN. The projection is based on a base year of either 2005/06 or 2006/07 using drivers to project our proposals for the full control period. The GDN's own proposals are used as a test against our own projections.

The second makes use of the GDN's own proposals across the whole period. In order to use the GDN's proposals we first remove the GDN's own assumptions for RPEs. PB Power's assumptions for RPE are then applied to create the final proposal.

Finally PB Power has also made use of bottom-up analysis where regression was not appropriate or to support the use of regressions.

A7.1.2 REGIONAL FACTORS

Regional factors have been considered to impact the costs of activities carried out in the network, unless specifically stated otherwise. Costs are disaggregated into the four categories of Contractors, Direct Staff/Overheads, Materials and Other. Regional factors have been applied to Contractor and Direct Staff costs. No regional factors have been applied to materials or other expenditure.

A7.1.3 RPE ADJUSTMENTS

NGNs assumptions for RPEs used in the analysis are shown in the table below

Contractors	Direct Staff	Materials	Other
4.00%	2.00%	2.00%	0.00%

Table A7 - 1

PB Power assumptions for RPEs used in the analysis are shown in the table below

Contractors	Direct Staff	Materials	Other
2.25%	1.00%	1.00%	0.00%

Table A7 - 2

A7.1.4 EXPENDITURE CATEGORIES

A number of different expenditure categories are listed in the BPQ. Each category has been aligned to one of the four categories used within our analysis. The table below lists these allocations.

BPQ Category	Expenditure category
Accounting Control	other
Atypicals	other
Bad debt	other
Depreciation	other
Excluded Services	other
Formula rates	other
income	income
Materials	materials
misc expenditure	other
Net Staff Costs (including Agency Costs)	direct
Non salary staff costs (including T&S)	other
NSA's	other
Ofgem Licence	other
Other	other
Other	other
Pension deficit / surplus	other
PPF Levy	other
Professional and consultancy fees	contract
Profit/ loss on sale of fixed assets	other
Release of Customer Contributions	other
Rents and buildings	other
Road occupation cost	other
Shared services cost from table B2	other
Shared services cost from table B2	other
Shrinkage	other
Subcontractors	contract
Transport & plant	other
Wayleaves	other
Xoserve	other

Table A7 - 3

A7.2 WORKED EXAMPLE

A worked example is given below for the Repair work activity in Northern. Many of the principles of the data calculations are similar for other work activities, where different techniques are used these are detailed under the appropriate activity heading.

A7.2.1 EXPLANATION OF THE COSTS AND VOLUME INPUTS TO THE REGRESSION ANALYSIS.

For Repair the regression analysis has been carried out on the 2005/06 data although for some other activities 2006/07 has been used as the base year. Full details of the reasoning behind the choice of base year are given in the main report under each activity.

Steps for tracking the data

From the BPQ the Repair costs submitted have been taken as below

Gross

Category	£m 2005/06
contract	4.10
direct	4.80
materials	0.60
other	1.00
Gross	**10.50**

Table A7 - 4

The BPQ costs have been normalized in 2 stages. The initial stage makes the Cost transfers, GDN reallocations accounting adjustments and pension adjustments. These adjustments are shown within the pivot tables as **Adjusted BPQ.**

The final stage of the normalization is the adjustments for Removed Costs. These final costs adjustments are made within the analysis sheets directly.

The table below listed the Adjusted BPQ figures.

Category	**Gross £m 2005/06**
contract	4.10
direct	5.42
materials	0.60
other	0.50
Gross	**10.62**

Table A7 - 5

There are no removed costs which feed into any of the regression calculations.

In order to calculate the National figures both contract costs and direct costs are divided by the appropriate regional factor to calculate the **RF Adjusted** figures.

GDN Regional Factor	**Contractor**	**Direct**
Northern	1.01	0.98

Table A7 - 6

Contract **4.10 / 1.01 = 4.05**
Direct **5.42 / 0.98 = 5.54**

Materials and other costs are not adjusted for regional factors.

Category	**£m 2005/06**
contract	4.05
direct	5.54
materials	0.60
other	0.50
Gross	**10.69**

Table A7 - 7

Total regionally adjusted costs into regression is **10.69**

This cost figure is used in the regression analysis along with the equivalent values for other GDNs.

A7.2.2 COST DRIVER

The workload is weighted by a standard monetary unit value for each activity. The workload is taken from the C18 Sheet supplied in the Capex/Repex PBQ submission.

Type of Repair	Number
Actioned Repairs to mains (condition)	10390
Actioned Repairs to mains (damage)	576
Actioned Repairs to services (condition)	10023
Actioned Repairs to services (damage)	2835
Total	**23824**

Table A7 - 8

The number of repairs to mains (condition) has been estimated against each pipe size according to the percentage population of pipes installed in the network.

Pipe Size	% Installed
</=3"	11.1%
4-5"	44.7%
6-7"	19.4%
8-9"	9.7%
10-12"	9.9%
>12-18"	4.3%
>18-24"	0.8%
>24"	0.1%

Table A7 - 9

The same representative unit costs have been used each Network and have been chosen by reference to contract rates for the four repair types; these are shown in the table below.

Repair Type		Unit Cost £
Mains (Condition)	</=3"	554
	4-5"	595
	6-7"	688
	8-9"	1130
	10-12"	1130
	>12-18"	1856
	>18-24"	1889
	>24"	3846
Service (Condition)		250
Mains (Damage)		326
Service (Damage)		202

Table A7 - 10

The number of repairs of each type is multiplied by the appropriate unit cost and summed to calculate the total CSV for the repair activity.

Repair Type		**Unit Cost £**
Mains (Condition)	</=3"	636
	4-5"	2764
	6-7"	1390
	8-9"	1134
	10-12"	1158
	>12-18"	831
	>18-24"	164
	>24"	33
Service (Condition)		2506
Mains (Damage)		188
Service (Damage)		572
Total		**11374**

Table A7 - 11

For Repair activities the total CSV is 11374. This figure has been used in the regression analysis.

A7.2.3 <u>REGRESSION TABLE</u>

The complete Repair regression table is given below:

GDN	**2005/06**	
	Volume	**Cost**
EoE	10314	10.22
Lon	8435	9.90
No	11374	10.69
NW	10853	10.82
Sc	7194	11.62
So	22466	21.63
WM	6677	7.10
WW	9805	9.93

Table A7 - 12

On all regression charts the volume driver is plotted along the x-axis and cost against the y-axis.

From this regression table the regression line is obtained and an upper quartile benchmark calculated as the target.

The regression formula takes the form **Slope x (Volume) + Intercept = (Cost)**

Regression Formula 0.000816 x (Volume) + 2.59766 = (Cost)

Benchmark Formula 0.000732 x (Volume) + 2.59766 = (Cost)

A7.2.4 COST PROJECTIONS

Having calculated the benchmark regression formula for the base year, the ***slope*** and ***intercept*** of this formula is reduced each year by the PB Power assumptions for productivity improvements.

Year	Slope	Intercept
2005/06	0.000732	2.59766
2006/07	0.000725	2.57168
2007/08	0.000717	2.54597
2008/09	0.000710	2.52051
2009/10	0.000703	2.49530
2010/11	0.000696	2.47035
2011/12	0.000689	2.44565
2012/13	0.000682	2.42119

Table A7 - 13

The formula is then used each year, with the work driver, to calculate the regionally adjusted cost for the total workload. This total is broken back into the individual activities in proportion to the weighted workload driver for each activity.

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Weighted Workload	11374	11054	10738	10435	10140	9854	9576	9306
Benchmark	10.92	10.58	10.25	9.93	9.63	9.33	9.05	8.77
Baseline	10.69	10.36	10.03	9.72	9.42	9.14	8.86	8.59
Gap	-0.24	-0.23	-0.22	-0.21	-0.20	-0.19	-0.19	-0.18
Line A	30%	30%	42%	53%	65%	77%	88%	100%
Line B	100%	100%	88%	77%	65%	53%	42%	30%
Convergence	-0.07	-0.07	-0.09	-0.11	-0.13	-0.15	-0.17	-0.18
Proposed (Ex RPE & RF)	10.85	10.51	10.16	9.82	9.49	9.18	8.88	8.59

Table A7 - 14

In the example of Repair the 2005/06 benchmark calculation is performed as follows:

0.000732 x (11374) + 2.59766 = (10.92)

A similar calculation is performed for each year and also for the baseline performance.

The gap between the baseline performance and the benchmark performance is calculated and a convergence is calculated using the percentages in either Line A or Line B in table 7A-14. If the gap figure is negative line A percentages are used if the gap figure is positive line B percentages are used. The convergence element is added to the benchmark figure to produce the proposed cost (prior to regional factors and RPE adjustments being applied).

In order to reapply regional factors and PB Power's assumptions for RPEs the average of 2nd and 3rd placed GDNs breakdown expenditure percentages for Contractors, Direct/Overheads, Materials and Other has been used.

A7.3 WORK MANAGEMENT

A7.3.1 ANALYSIS USED

Regression analysis has been used for Work Management. The regression has been carried out on a linear basis using a composite variable reflecting distribution system network length and the PB Power adjusted numbers of Public Reported Escapes (PREs) and Repairs. To calculate the composite variable, the numbers of PREs and repairs were normalised to the network length and were summed with the network length using the following weightings, 40% network length and 30% each for PREs and repairs. This composite variable was then compared in the regression analysis with the normalised work management Opex. The base year for Work Management is 2005/06.

A7.3.2 DATA USED IN THE ANALYSIS

The data provided in the BPQ, split the Work Management expenditure into various components, these were then aligned to the four components of Contractors, Direct/Overheads, Materials and Other. The term ‘Sum other’ is used in the data release workbooks to reflect the addition of any Income into the Other category.

A7.3.3 REGRESSION TABLE

Details are provided in the data release workbook.

A7.4 EMERGENCY

A7.4.1 ANALYSIS USED

Regression analysis has been used for Emergency. The regression as been carried out on a linear basis using a composite variable reflecting the PB Power adjusted numbers of PREs and Repairs. To calculate the composite variable, the numbers of PREs and repairs were adjusted into a weighted average using a weighting of 80% PREs and 20% repairs. This composite variable was then compared in the regression analysis with the normalised emergency Opex. The base year for Emergency is 2005/06.

A7.4.2 DATA USED IN THE ANALYSIS

The data provided in the BPQ, split the Emergency expenditure into various components, these were then aligned to the four components of Contractors, Direct/Overheads, Materials and Other. The term ‘Sum other’ is used in the data release workbooks to reflect the addition of any Income into the Other category.

A7.4.3 REGRESSION TABLE

Details are provided in the data release workbook.

A7.5 OTHER DIRECT ACTIVITIES

A7.5.1 ANALYSIS USED

Regression analysis has been used for Other Direct Activities. The regression as been carried out on a log linear basis using the driver of total network length (distribution above and below 2 bar and LTS) in km. The driver has been compared in the regression analysis with the normalised other direct activities Opex The base year for Other Direct Activities is 2006/07.

A7.5.2 DATA USED IN THE ANALYSIS

The data provided in the BPQ, split the Other Direct Activities expenditure into various components, these were then aligned to the four components of Contractors, Direct/Overheads, Materials and Other. The term ‘Sum other’ is used in the data release workbooks to reflect the addition of any Income into the Other category.

A7.5.3 REGRESSION TABLE

Details are provided in the data release workbook.