Promoting choice and value for all gas and electricity customers

RIIO T1

Consultation on strategy for the next transmission price control – RIIO-T1 Tools for cost assessment

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Target audience: Consumers and their representatives, transmission companies, generators and offshore gas producers/importers, suppliers, shippers, debt and equity investors, environmental organisations, distribution network companies, government policy makers and other interested parties.

Overview:

The next transmission price controls, RIIO-T1, will be the first to reflect the new RIIO model. RIIO is designed to drive real benefits for consumers; providing network companies with strong incentives to step up and meet the challenges of delivering a low carbon, sustainable energy sector at a lower cost than would have been the case under our previous approach. RIIO puts sustainability alongside consumers at the heart of what network companies do. It also provides a transparent and predictable framework, with appropriate rewards for delivery.

We are now consulting on the strategy for the price control review. This supplementary annex to the main consultation document sets out our proposed tools for cost assessment. This document is aimed at those who want an in-depth understanding of our proposals. Stakeholders wanting a more accessible overview should refer to the main consultation document.

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Main consultation paper

- Consultation on strategy for the next transmission price control - RIIO-T1 Overview paper (159/10)
  http://www.ofgem.gov.uk/Networks/Trans/PriceControls/RIIO-T1/ConRes/Documents1/RIIOT1%20overview.pdf

Links to supplementary annexes

- Consultation on strategy for the next transmission price control - RIIO-T1 Outputs and incentives
  http://www.ofgem.gov.uk/Networks/Trans/PriceControls/RIIO-T1/ConRes/Documents1/T1%20Outputs%20incentives.pdf
- Consultation on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Business plans, innovation and efficiency incentives
  http://www.ofgem.gov.uk/Networks/Trans/PriceControls/RIIO-T1/ConRes/Documents1/T1%20and%20GD1%20BP%20prop.pdf
- Consultation on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Financial issues
  http://www.ofgem.gov.uk/Networks/Trans/PriceControls/RIIO-T1/ConRes/Documents1/T1%20and%20GD1%20finance.pdf
- Consultation on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Uncertainty mechanisms
  http://www.ofgem.gov.uk/Networks/Trans/PriceControls/RIIO-T1/ConRes/Documents1/T1%20and%20GD1%20uncert.pdf
- Consultation on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Impact Assessment
  http://www.ofgem.gov.uk/Networks/Trans/PriceControls/RIIO-T1/ConRes/Documents1/T1%20and%20GD1%20IA.pdf

Links to other associated documents

- Consultation on strategy for the next gas distribution price control - RIIO-GD1 Overview paper (160/10)
  http://www.ofgem.gov.uk/Networks/GasDistr/RIIO-GD1/ConRes/Documents1/RIIOGD1%20overview.pdf
- Handbook for implementing the RIIO model - Ofgem, October 2010
  http://www.ofgem.gov.uk/Networks/rpix20/ConsultDocs/Documents1/RIIO%20handbook.pdf
- RIIO: A new way to regulate energy networks: Final decision
  http://www.ofgem.gov.uk/Networks/rpix20/ConsultDocs/Documents1/Decision%20doc.pdf
- Approach and timetable for TPCR5: decision document (21/10)
  http://www.ofgem.gov.uk/Networks/Trans/PriceControls/TPCR5/Documents1/TPCR5%20Approach%20and%20Timetable%20-%20Decision%20Document%20-%20FINAL.pdf

A glossary of terms for all the RIIO-T1 and GD1 documents is on our website:
http://www.ofgem.gov.uk/Networks/GasDistr/RIIO-GD1/ConRes/Documents1/Glossary.pdf

Table of Contents

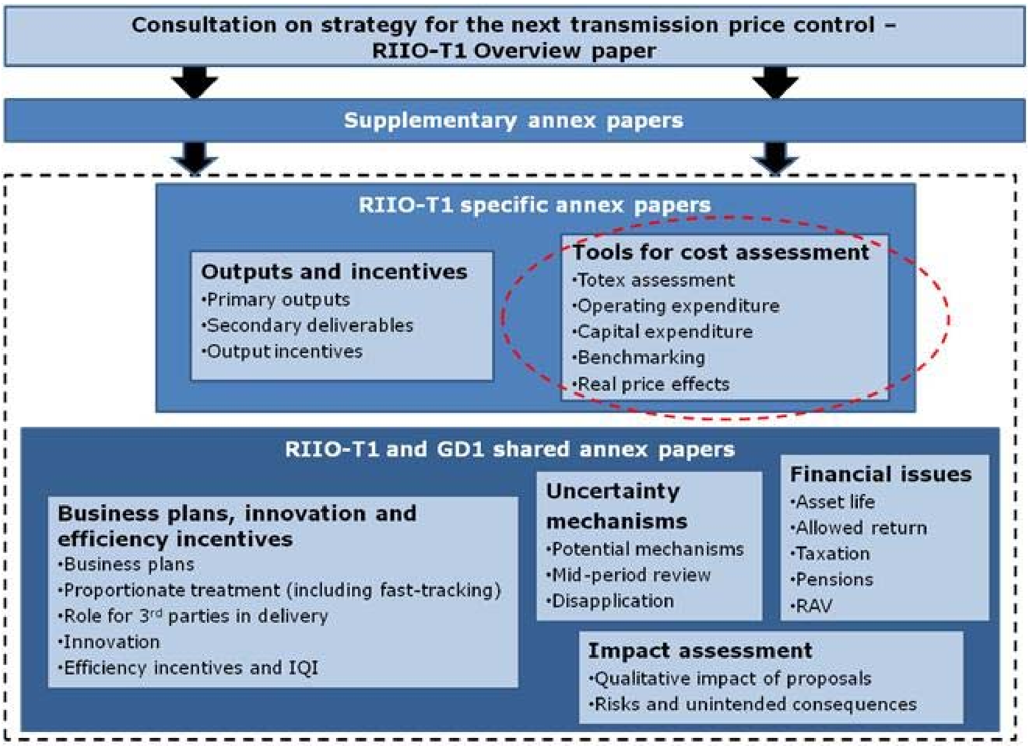
1. Introduction

Chapter Summary
This chapter presents overall expenditure forecasts and discusses cost assessment in the context of the form and structure of the price control.

Introduction

1.1. The next transmission and gas distribution price controls, RIIO-T1 and GD1, will be the first to reflect the new RIIO model. We are now consulting on the strategy for the two price control reviews. This supplementary annex to the main consultation document for RIIO-T1 sets out our proposed tools for cost assessment. This document is aimed at those who want an in-depth understanding of our proposals. Stakeholders wanting a more accessible overview should refer to the RIIO-T1 Overview Paper. Figure 1.1 below provides a map of the RIIO-T1 documents published as part of this consultation.

Figure 1.1 RIIO-T1 Supplementary appendix document map*



*Document links can be found in the 'Associated documents' section of this paper.

1.2. As in past reviews, the price control will be set using a building block approach incorporating incentives to encourage network companies to deliver outputs and value for money in the longer term.

1.3. The key difference now is how the building blocks will be set. In particular the fact that our approach will be outputs-led in the sense that outputs feed in and influence other elements of the framework.

1.4. This annex considers how we will apply a proportionate, output focussed approach to cost assessment using a toolkit of methodologies such as:

- total expenditure (totex) benchmarking
- disaggregated benchmarking
- historical trend analysis
- unit quantity analysis
- asset unit cost analysis
- output unit cost analysis
- expert review
- project by project review.

1.5. The above techniques rely largely on historic or contemporary comparisons. However, we will also be looking to transmission owners (TOs) to include forward cost movements in their projections. In Chapter 3 of this annex, we discuss real price effects (RPEs) and ongoing efficiency, including:

- expected productivity improvements to be made by an efficient company which we refer to as ongoing efficiency improvements
- expected changes in input prices (eg wages) relative to the retail price index (RPI), which we refer to as RPEs.

Context

1.6. Under the RIIO model, we will continue to set price controls using a building block approach incorporating incentives to encourage network companies to deliver outputs and value for money in the longer term. However, the way the building blocks will be set will be different to our previous approach. This is, in particular, due the outputs-led nature of RIIO.

1.7. Our assessment of the outputs that the TOs are required to deliver and the associated revenue they may collect from consumers will be informed, to a large degree, by the business plans put forward by the TOs. As set out in our supporting annex on business plans, innovation and efficiency incentives, TOs will need to set out in their business plans what they intend to deliver for consumers over time and what revenue they need to earn from existing and future consumers to ensure delivery is financeable. The onus is on TOs to justify their view of required expenditure.

1.8. We expect a TO to consider a range of options for delivering primary outputs and explain why its proposal is the best way forward. When making the case for its preferred proposal we would expect the TO to demonstrate that it had considered the long-term costs and benefits of the most viable options.

1.9. The TOs will also need to demonstrate that their proposals are cost efficient over the long term.

1.10. This supplementary annex discusses the methods we will use to assess the costs proposed by the TOs and the quality, robustness and objectivity of their cost justifications.

Historical costs

1.11. The TOs' revenue allowances for the current price control review period, Transmission Price Control Review (TPCR4), are shown below:

Table 1.2 - TPCR4 revenue allowances[1]

Final Proposals for base price control allowances (2004/05 prices)					
£million	**NGG**	**NGET**	**SPTL**	**SHETL**	**Total**
Annual Base Revenue 2007/08 (Table 2.2)[2]	487	985	147	47	1667
Capex Allowances - 5 year total (Table 2.3)	824	2997	608	181	4609
Opex Allowances - 5 year total (Table 2.4)	688	1289	143	46	2166

1.12. Table 1.2 illustrates the relative size of the various TOs from a financial perspective. In Figure 1.1, the subsequent adjustments to capital expenditure (capex) through the transmission investment for renewable generation (TIRG) allowances and the transmission investment incentive (TII) have significantly increased the capex allowances going forward.

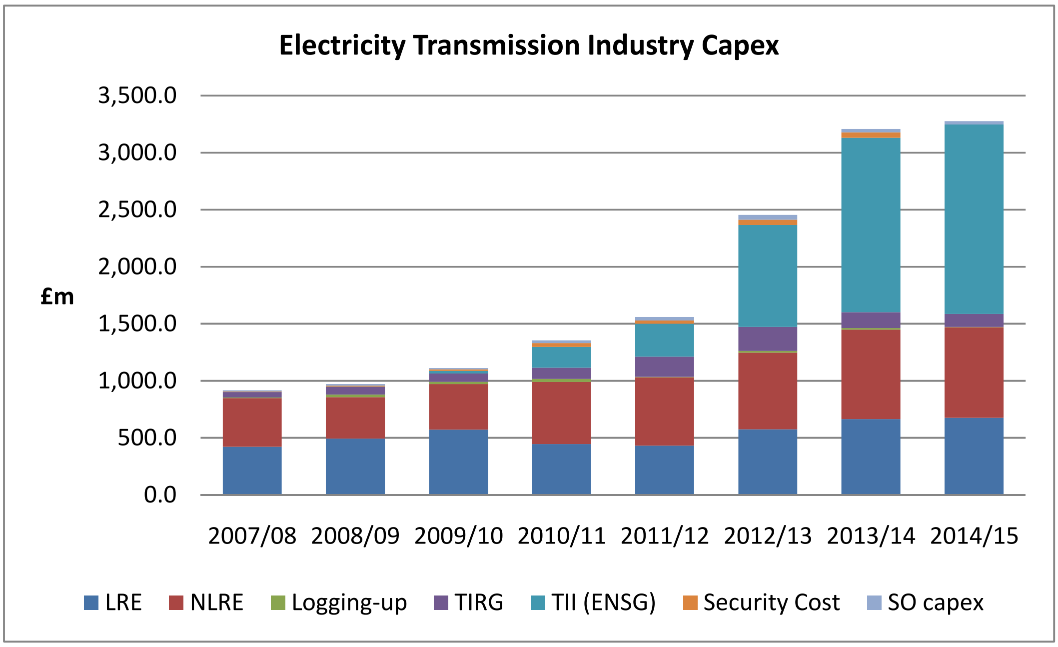
Forecasts

1.13. The TOs submitted forecast capital and operating expenditures to us as part of the TPCR4 rollover. As shown in Figure 1.2, electricity TOs are forecasting significant increases in capex over coming years in all expenditure categories.

[1] TPCR4 Final Proposals, tables 2.2, 2.3 and 2.4 at http://www.ofgem.gov.uk/Networks/Trans/Archive/TPCR4/ConsultationDecisionsResponses/Documents1/16342-20061201_TPCR%20Final%20Proposals_in_v71%206%20Final.pdf

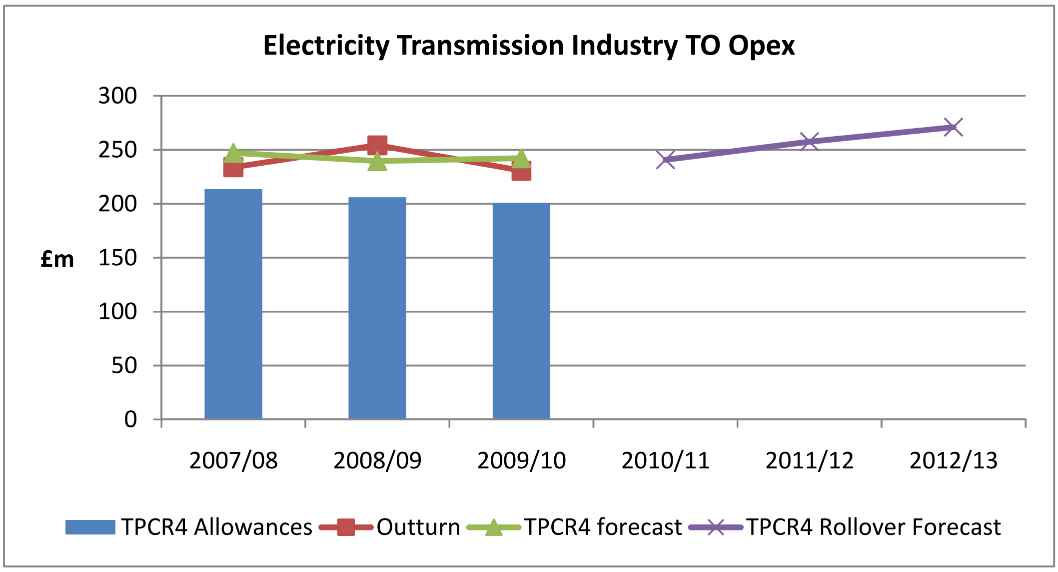
[2] For annual base revenue, the table shows the proposed revenue allowances for 2007/08, which for electricity transmission companies were to be followed by annual increases at 2 per cent above the rate of inflation.

Figure 1.2 - Electricity Transmission Industry Capex (Historical and Forecast based on TPCR4 Rollover Submissions)



1.14. Operating expenditure (opex) is also forecast to increase to a lesser extent:

Figure 1.3 - Electricity Transmission Industry TO Opex



1.15. Similarly, increases are also proposed in gas transmission for both capex and opex:

Figure 1.4 - Gas Transmission Industry Capex

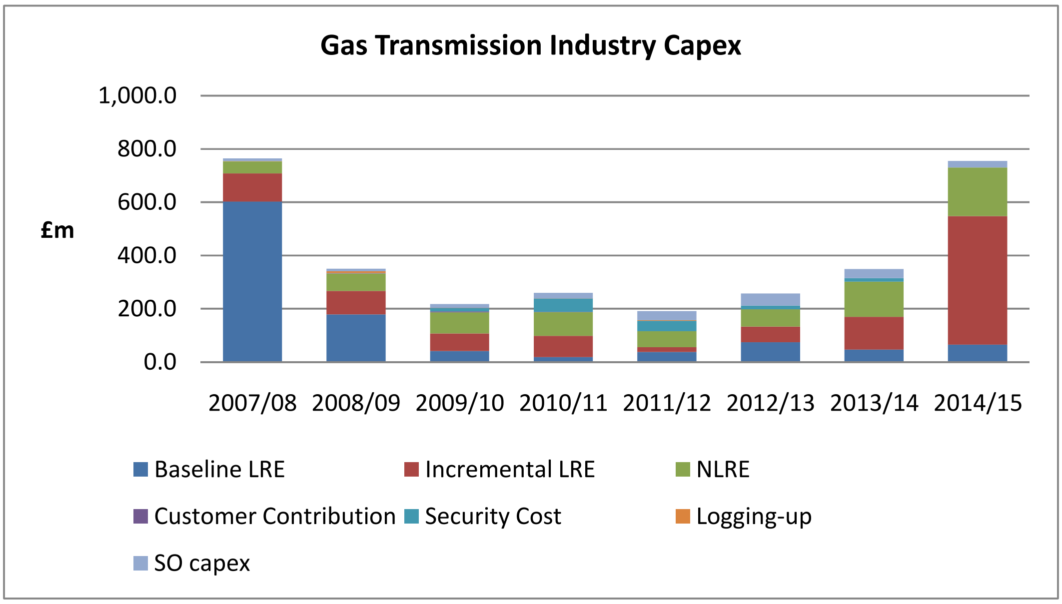
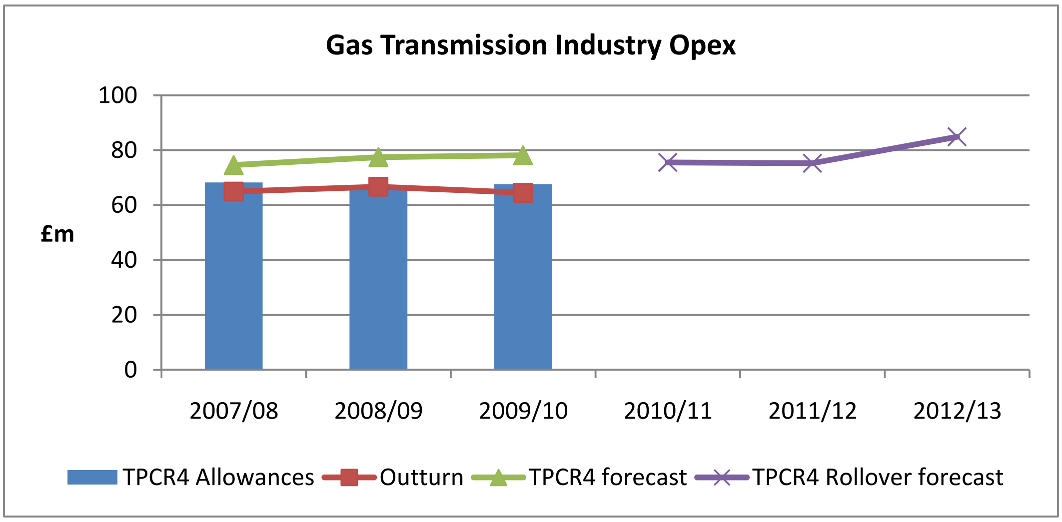


Figure 1.5 - Gas Transmission Industry Opex



1.16. Whilst these forecasts are those put forward for the TPCR4 rollover, the significance of the changes will clearly be an area of focus for us as part of our initial sweep in RIIO-T1. Given the magnitude of the proposed expenditures, we will be looking to the business plans to provide robust objective evidence demonstrating that proposed costs are efficient, and that they link to outputs.

2. Cost assessment overview

Chapter Summary
In this chapter we discuss our approach to cost assessment. In particular, we discuss our proposed use of a toolkit approach, including totex but supported by a range of other methods.

Question 1: Have we proposed an optimum range of techniques
(a) Are there better techniques that we have not included?
(b) Are we applying the appropriate techniques in the appropriate areas?

Background

2.1. As described above, TOs will need to demonstrate that their proposals are cost efficient for delivering the proposed outputs over the long term.

2.2. As set out in our supplementary annex on RIIO-T1 and GD1 Business plans, innovation and efficiency incentives, the intensity of our cost assessment process – fast-tracking, light-touch or full review - will be largely based on how satisfied we are that the evidence and analysis, provided by the TO in support of its submission, is proportionate, rigorous and objective.

2.3. The RIIO model emphasises the importance of placing more focus on the companies' forecasts and the use of benchmarking as a means on informing our assessment of these forecasts rather than as a mechanistic means of setting allowances. It places more emphasis on forecasts as these are likely to be more relevant in the context of our sustainability objectives and the introduction of new output measures.

2.4. This is in contrast to previous price control reviews where we have set baselines for the companies for specific activities based on an efficiency review of their historical costs and an assessment of their forecasts. For example, we relied extensively on benchmarking across gas distribution networks (GDNs) in Gas Distribution Price Control Review 1 (GDPCR1).

2.5. Historically we have used this analysis to determine an appropriate benchmark level of costs in the base year and then rolled this forward taking account of ongoing efficiencies and real price effects to determine price control baselines. On opex we also made an adjustment to take into account trade-offs between different activities based on an assessment of total opex.

2.6. For TPCR4 our analysis was much more reliant on bottom up assessment of each of the main activities and adjustments to the companies' forecasts. We employed consultants to carry out an expert review of each of the main direct and indirect operating cost activities. We also carried out asset replacement, load related modelling, unit cost analysis and scheme specific reviews to determine the appropriate capex baselines and carried out specific reviews for larger schemes. We then applied a similar approach to real price effects and ongoing efficiencies.

Methodologies

2.7. For RIIO-T1 and GD1, we will make use of aggregated top-down approaches such as total expenditure benchmarking. Consistent with Frontier Economics recommendation that "…*we propose that Ofgem seeks to supplement this analysis with a range of other approaches. Since no single approach is likely to provide definitive results, there is merit in gathering together as wide a portfolio of information as is possible*"[3], we will also make use of other more disaggregated analysis to inform our views on the reasonableness of the overall costs proposed in the business plans.

2.8. Based on both the Frontier work and our own internal development we have identified a number of criteria for choosing our analytical techniques. These are:

1. Robustness – the process and the resulting performance assessment should be perceived to be robust by network operators and other stakeholders.
2. Transparency – the methodology and the rational for its use should be clear and easy to understand. The entire process should be easy to replicate.
3. Promotion of efficiency – the methodology should promote not just efficient cost management, but also strike an appropriate balance between low costs and desired outputs, ie it should provide value for money for delivering outputs. The methodology should also minimise the extent to which they distort incentives to favour one cost type over another.
4. Consistency with the wider regulatory framework – the methodology should foster the high level objectives of the wider regulatory regime and strike an appropriate balance between different objectives. It should also encourage operators to innovate while providing appropriate protection from unnecessary expenditure for customers.
5. Reasonableness of data requirements – the methodology should be developed in a way that enables data collection and compilation to be undertaken without both the regulator and regulated companies over stretching their resources.
6. Adaptability – given the likelihood of material changes in the availability and relevance of certain data over time as network roles evolve, there is merit in pursuing a technique that can adapt and remain fit for purpose.
7. Proportionate resource cost – the methodology should be developed in a way that enables analysis to be undertaken without both the regulator and regulated companies over stretching their resources.

2.9. As part of both RIIO-T1 and GD1 we are looking to develop a toolkit approach to cost assessment that can be used in assessing companies forecasts both as part of the initial sweep[4] and for the more detailed analysis of companies' whose

[3] Page 83 of publication "RPI-X@20: The future role of benchmarking in regulatory reviews - a final report prepared for Ofgem.
[4] See also supplementary annex - RIIO-T1 and GD1 Business plans, innovation and efficiency incentives.

submissions are not deemed suitable for fast-tracking, but which will be subject to varying degrees of scrutiny depending on their robustness.

2.10. As in TPCR4, we propose a combination of top-down and bottom-up analyses in order to obtain a balanced view of TO's expenditure requirements.

1. '**Top-down'** – This approach may include comparing productivity to other companies in the same or related sectors of the industry, or benchmarking against international companies. An advantage of this approach is that it can capture economy–wide and sectoral factors such as technological development, labour, and other input costs that may be missed in a bottom up approach. Given adequate data, top down approaches can be applied to a whole TO or to disaggregated components such as direct opex or components of indirect capex.
2. '**Bottom-up**' – This assessment splits the cost base into the key individual activities of the transmission companies and builds up the total costs by rolling up the work required from a zero base in order to identify the efficient level of costs that should have been incurred. Examples of the application of this approach include development of direct opex or replacement capex through multiplying efficient quantities by efficient costs, or by summing together individual projects that have been subjected to project by project review.

2.11. There is some crossover between top-down and bottom-up approaches. For example, bottom-up approaches can use methods such as benchmarking between TOs, and comparison to historical performance and trends in order to determine efficient unit costs and efficient quantities. Similarly, top-down approaches which focus on benchmarking may be supported by more detailed analysis such as expert review in order to identify likely cost drivers.

2.12. The development of annual cost reporting data means that there is now much more comprehensive cost and driver information available across activities, across companies and, in some cases, across industries. This gives us the scope to make greater use of more disaggregated benchmarking approaches in carrying out cost analysis.

2.13. The more disaggregated approaches are important in ensuring our methodology is robust as this is the first time we are making full use of the total expenditure benchmarking techniques. They are also helpful in identifying and highlighting potential areas of efficiency and enabling a more informed discussion with the companies over their costs and allowing us to target those areas of business plans where we require stronger justification.

2.14. For the initial sweep we will also undertake a small quantity of more detailed bottom up analysis, such as expert review of some unit costs, high level modelling of some quantities and detailed review of a small sample of projects or programmes. The focus of this more detailed analysis will be to verify that the processes that the TOs have applied in developing their business plans have resulted in efficient costs and in programmes of work that effectively support the delivery of outputs.

2.15. Our toolkit of approaches, and the areas in which we intend to apply them, is set out below:

Figure 2.1 Cost Assessment Techniques

<table>
<tr><th colspan="7">Cost Assessment Techniques</th></tr>
<tr><th>Resource Intensity</th><th></th><th>Direct Opex</th><th>Indirect Opex</th><th>Load Related Capex</th><th>Non-Load Related Capex</th><th>Initial Sweep</th></tr>
<tr><td rowspan="7">Lighter Touch</td><td>Total Expenditure Benchmarking</td><td colspan="4">✓</td><td rowspan="7">Full</td></tr>
<tr><td>Disaggregated Benchmarking</td><td>✓</td><td>✓</td><td>✗</td><td>✓</td></tr>
<tr><td>Historical Trend Analysis</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Unit Quantity Analysis</td><td>✓</td><td>✗</td><td>✓</td><td>✓</td></tr>
<tr><td>Asset Unit Cost Analysis</td><td>✓</td><td>✗</td><td>✓</td><td>✓</td></tr>
<tr><td>Output Unit Cost Analysis</td><td>✗</td><td>✗</td><td>✓</td><td>✗</td></tr>
<tr><td>Expert Review</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>More Detailed</td><td>Project by Project Review</td><td>✗</td><td>✓</td><td>✓</td><td>✓</td><td>Sample</td></tr>
</table>

Total expenditure benchmarking

2.16. We intend to benchmark total expenditure[5] over a number of years' data using suitable cost drivers. We consider that totex rather than total cost analysis is the most appropriate methodology for international benchmarking as it best overcomes issues associated with different reporting arrangements and accounting treatments. Other benchmarking methods that look to allocate a measure of capital consumption suffer from consistency issues.

2.17. We are developing an international dataset for transmission. International comparison is necessary as in Great Britain (GB) there are only three electricity TOs with significantly different scales of operation, and only one gas TO. We also intend to carry out benchmarking between the GB electricity TOs where this is beneficial, but note the different scale of the three businesses.

[5] Total expenditure refers to the total amount spent by a business each year, regardless of whether it is capital or operating expenditure. Total cost refers to operating expenditure plus a measure of capital consumption (analogous to depreciation).

2.18. The set of cost drivers for our totex work is still under review. Key measures such as peak demand, peak generation, wheeled capacity, network density and asset metrics are being considered. We will consider the most suitable approach(es) based on engineering judgement on the appropriate drivers, availability of data and the statistical significance of the inputs to benchmarking results.

2.19. We envisage providing initial totex results to TOs in conjunction with release of the March strategy decision document. Totex is discussed in more detail in Chapter 4.

More disaggregated and bottom up analysis

2.20. As discussed above we are developing a range of tools as part of our analytical toolbox.

2.21. For direct opex and closely associated indirect costs[6] our approach will include:

- assessing the TOs' forecast total costs and comparing this to historical costs, trends and benchmark comparators
- assessing the TOs' forecast quantities and unit costs and comparing this to historical quantities and costs, trends and benchmark comparators
- conducting expert review of key policies and practices, in particular those which form part of the TOs' asset management strategies, with possible expert review.

2.22. Our direct opex assessment is discussed further in Chapter 5.

2.23. We intend assessing indirect costs that are closely associated with operating activities and capital works as part of our assessment of those activities.

2.24. For capex we intend to carry out both load and non-load related modelling.

2.25. Our view on the volume of asset replacement will also be informed by age based modelling and information provided by the TOs on secondary deliverables relating to asset health, criticality and replacement/risk priorities. Our view will also be informed by the risk and reliability outcomes proposed by the TOs in their business plans.

2.26. For load-related expenditure we intend to carry out some high level modelling based on capacity requirement, but the nature of the expenditure means that we will be more focused on expenditure required at key boundaries and the costs of associated projects. Our approach to load related expenditure and uncertainty is set out in 'Supplementary Annex - Outputs and incentives.'

[6] Closely associated indirect costs include activities related to managing and building the network, such as network design and engineering, engineering management and clerical, wayleaves administration, control centre and system mapping.

2.27. We intend to undertake unit cost analysis for the major asset types (including transformers, switchgear, metering, control, overhead lines, underground cables, other substation expenditure). We intend to seek expert advice on the appropriate levels of unit costs in these areas. We intend to seek expert advice on the efficient level of costs for a subset of representative schemes. The scope of this review will differ between the fast track and more detailed cost assessment. Our approach to capex assessment is discussed further in Chapter 7.

Business support assessment for both reviews

2.28. Much of the analysis for business support costs will be the same for transmission and gas distribution. We intend to compare costs in transmission, gas distribution and electricity distribution where possible. We intend to benchmark these costs by group. We consider that there are 3 main groups of such costs: information systems (IS), property and other business support costs. Further detail is provided in Chapter 6.

Fast-tracking and more detailed approach

2.29. We are looking to have the majority of our analysis methodology in place in advance of the July business plan submissions by the companies. We can test our approach using historical data and forecasts submitted for the TPCR4 rollover, and this will enable us to run the analysis quickly when the forecasts come in and allow us to have more interaction with the companies.

2.30. The way in which we apply the analysis will differ between the initial sweep for fast-track companies and the more detailed analysis of other remaining companies that follow, although it will essentially make use of the same tools.

2.31. The fast-tracking assessment will take place at a higher level relying on the companies' forecasts and our analytical tools described earlier. Where companies' forecast and historical costs are shown to be high we will expect this to be adequately justified in their business plans through, for example, linkages to their forecast outputs. If insufficient justification is provided then they are unlikely to be suitable for fast-tracking.

2.32. The businesses that do not pass the fast-track assessment will be subject to a more detailed review of costs and outputs. The detailed review will involve us scrutinising the data submissions to a greater extent and will likely require the TOs to provide more information in support of their plan.

2.33. Where a TO is not suitable for fast-tracking, we envisage that the initial sweep process will enable us to identify areas where we may be able to apply a lighter touch approach. We will then both be able to focus our resources on areas and companies where further justification and analysis is required.

3. Real price effects and ongoing efficiency

Chapter Summary
This chapter sets out the type of analysis that we expect to carry out to assess the forecasts submitted by the TOs for input price inflation and ongoing efficiency improvements. It also outlines some of the issues that we expect the TOs to take account of in their business plans when justifying their proposals.

Question 1: Are there any additional analytical techniques that we should consider beyond those we have used at past price control reviews to assess these factors?
Question 2: Are there any additional data sources that we should be aware of to assist with our analysis in these areas? In particular, are there specialist labour indices that would be relevant for the gas transmission sector?
Question 3: Of the data sources presented in this chapter, are there some that you think we should rely more on than others?

Overview

3.1. Our cost assessment analysis will help form our view of the efficient level of costs for each network operator. This analysis will be on both historical and forecasted costs submitted by the companies as part of their business plans. The analysis of historical costs can be used to determine an efficient cost level in a particular year. We will need to make a number of adjustments to this level of efficient costs in order to assess the reasonableness of the costs forecasted by the companies as part of their business plans. The network companies will also need to incorporate these factors into their forecasts. These adjustments will need to account for the following factors:

- changes in the volume of activity
- changes in the scope of work (eg a new safety requirement) that might affect the unit cost of the activity
- expected productivity improvements to be made by an efficient company which we refer to as ongoing efficiency improvements
- expected changes in input prices (eg wages) relative to the RPI which we refer to as RPEs.

3.2. This chapter addresses the last two of these issues. It sets out the type of analysis we expect to carry out to assess the forecasts submitted by the companies and also the issues that we expect the companies to take into account when submitting a well justified business plan.

Input price inflation

Summary of approach

3.3. Allowed revenues are indexed by the RPI as part of the price control. However, it is expected that the price of several inputs – most notably labour – will not rise in line with RPI inflation. To account for this differential between RPI inflation and expected input price inflation we consider it appropriate to include an additional adjustment to allowed revenues. We propose this adjustment is made ex ante based on forecasted differences between RPI and input price inflation, ie there will be no indexation of allowed revenues with respect to input prices. Some of the network companies have suggested implementing indexation of input prices, this issue is discussed in 'Supplementary Annex - Uncertainty mechanisms.'

3.4. Our approach to setting assumptions at the last two reviews (Distribution Price Control Review 5 (DPCR5) and GDPCR1) has been to examine historical trends of relevant price indices relative to the RPI to inform our assumptions for RPEs. We expect this approach to continue and we welcome feedback from stakeholders on the most appropriate price indices we should examine as part of our analysis. In particular we seek feedback on whether we should look at different indices from those which were covered at DPCR5 and GDPCR1 which covered both the gas and electricity sectors. Indices to be considered are outlined in Table 3.1.

Table 3.1 - Data sources considered at recent price controls

Source	Description
ONS Average Earnings Index (AEI)	General labour costs index
ONS Annual Survey of Hours and Earnings (ASHE)	Sector specific data on earnings and hours paid
ONS Producer Price Indices (PPI)	Input and output indices by sector
Joint Industry Board (JIB)	Labour costs for the electrical contracting industry
Building Cost Information Services (BCIS)	Various cost indices for the construction industry, eg Price Adjustment Formulae Indices (PAFI) (Previously known as Baxter Indices), Tender Price Index
British Electrotechnical and Allied Manufacturers Association (BEAMA)	Labour and material cost indices for the electrical and mechanical engineering industries
Bloomberg	Commodity prices
Royal Institute of Chartered Surveyors (RICS)	Commercial rent cost forecast

3.5. We set out our views on two issues which were raised at DPCR5 in the sub-sections below.

Contractor labour and specialised labour

3.6. At DPCR5 we did not include any wage growth differential between contractor labour and internal labour. This was because we thought that the method of service delivery should not affect the efficient costs to be allowed under a price control. We would expect the network operators to respond to any movements in the relative prices of insourced versus outsourced labour costs. We consider this approach to be appropriate for the upcoming price controls.

3.7. However, we did include a wage growth premium for specialised labour at DPCR5 based on the evidence considered at the time. The network operators would need to justify any such assumption included as part of the business plan submissions.

Notional structure

3.8. We propose to assess the forecasts submitted by the companies against a notional business structure (the proportion of inputs that are labour, materials, etc) rather than the weights of different inputs proposed by the companies. We consider this appropriate because if we set RPE allowances based on particular organisation structures, we may reward inefficient structures or give greater opportunities for less efficient companies to outperform the settlement simply by shifting their structure to those other companies have in place.

3.9. We recognise that companies will be undertaking activities, each of which may have their own rates of input price inflation, in different proportions. We propose to examine input price growth of each significant area of expenditure separately, and combine these different rates of growth according to the breakdown of work to be undertaken by each company.

Ongoing efficiency

3.10. Our comparative efficiency analysis, carried out as part of the cost assessment, helps us to identify scope for catch-up by the less efficient companies. However, this analysis does not identify the productivity improvements that can be made by the frontier companies, for example by employing new technologies. These improvements are captured by our ongoing efficiency assumption. This assumption represents the reduction in input volumes that can be achieved whilst delivering the same outputs. The very nature of the assumption means that it cannot solely be based on what efficiency improvements are visible at the price control review as this would overlook the improvements that have not yet been identified and happen on a regular basis throughout the economy.

3.11. As in past price control reviews, we propose to analyse data from productivity datasets such as EU KLEMS (capital (K), labour (L), energy (E), material (M) and service inputs (S)) growth and productivity accounts, which contain input and output data for the different sectors in the economy. It is necessary to look at other sectors as the data in the energy network sector has been heavily influenced by the privatisation effect, ie the large increases in productivity that were realised after privatisation. The sectors focussed on to inform this assumption have been those with similarities to the network operators, eg the sectors with significant asset management roles.

3.12. There are other sources of evidence that we also propose to examine. For example, the Office of National Statistics (ONS) measures of productivity for the electrical, gas and water industries referenced in the recent Bristol Water investigation by the Competition Commission. We will also examine output/tender price data for capital projects such as the construction output price index (COPI) which is used by Ofwat as part of its price control process. Trends in these price indices will contain the combined effect of input price inflation and efficiency improvements. Analysis of these price indices can be a useful crosscheck on the results emerging from our separate analyses of RPEs and ongoing efficiencies for capex activities undertaken by the network operators.

4. Total expenditure analysis

Chapter Summary
This chapter explains our reason for choosing the techniques we intend to apply in total expenditure benchmarking and how we intend to apply them.

Question 1: Are our proposed cost drivers appropriate. Should additional drivers be tested?
Question 2: Are there additional sources of data we could be looking to in order to increase the robustness of our analysis?

Background

4.1. As outlined in the RIIO handbook,[7] benchmarking will form part of the RIIO assessment toolkit.

4.2. There will not, however, be a mechanistic link between the benchmarking assessment and our view on base revenue for a company. Rather, the benchmarking assessment at the initial sweep will be one piece of evidence used to inform our view. For TOs that are not fast tracked, we will use the high level benchmarking analysis as the basis for raising questions with companies about their relative efficiency in the sector.

4.3. We are placing more emphasis on total expenditure assessment as this potentially avoids risks of biasing TOs towards particular solutions by avoiding issues associated with opex/capex trade-offs, and the results are less subject to skewing through inconsistencies in reporting across cost and jurisdictional boundaries.

4.4. More disaggregated analysis on the other hand allows us to consider the key factors driving individual activities. In addition, it provides information on why different companies might be efficient or otherwise, thus offering insights into why the aggregated outcome has been reached.

4.5. For RIIO-T1 we intend to carry out a combination of total expenditure analysis and disaggregated analysis. This chapter looks at the methods we expect to adopt for the analysis of total expenditure.

Methodological issues

4.6. Total expenditure benchmarking has a number of advantages. It is robust and transparent. Outcomes are not distorted by favouring one type of cost over another, and it provides the maximum scope for incorporating innovation. Importantly for international benchmarking, data can be collected and compiled at a high level, overcoming much of the difficulty involved in collecting disaggregated measures on a

[7] Handbook for implementing the RIIO model
http://www.ofgem.gov.uk/Networks/rpix20/ConsultDocs/Documents1/RIIO%20handbook.pdf

common basis across different reporting regimes. Total cost remains more relevant over time with changes to reporting regimes.

4.7. We believe that total expenditure benchmarking is consistent with light-touch approach to regulation, where business decisions are left to the regulated companies with the regulator concentrating on the total resource used and the outputs delivered. Benchmarking based on aggregated costs also requires fewer resource inputs for both the network operators and the regulator than that based on disaggregated costs. A more detailed discussion of the advantages and disadvantages of aggregated and disaggregated benchmarking is in appendix 2.

Choice of technique

4.8. There are two competing definitions of total costs. The first measure is operating expenditure plus a measure of capital consumption (analogous to depreciation). The second is annual opex plus capex (totex). Totex is simply a measure of the amount of cash being spent.

4.9. We consider that totex rather than total cost analysis is the most appropriate methodology for international benchmarking as it best overcomes issues associated with different reporting arrangements and accounting treatments. It does not rely on measures of asset values that differ significantly between countries.

Comparable data for benchmarking

4.10. We intend to draw comparable international data from the US Federal Energy Regulatory Commission (FERC) data and from other internationally available sources. As many transmission companies in the US are vertically integrated, we will need to allocate all general costs across the different business activities. The data will also need to be adjusted for purchasing power parity or exchange rates to make it comparable.

Benchmarking estimation

Identification of cost drivers

4.11. For electricity transmission, the cost drivers we have considered including measures of network density (line length, installed transformer capacity), asset operating metrics (voltages and types of assets), demand and demand growth.

4.12. For gas transmission, they include length of pipelines by pressure level, density of pipelines, units of gas transmitted, peak load, load growth, and number of off-takes and entry points.

Prioritisation of cost drivers

4.13. We will consider the most suitable drivers based on engineering judgement. We intend testing the sensitivity and statistical significance of the proposed drivers to confirm their impact on totex. Simple regressions of costs on potential cost drivers together with our data observations will inform our judgement. The list of potential cost drivers will also be influenced by the availability of international comparator data. Surrogate measures, such as energy, may need to be substituted for more ideal measures such as peak demand.

4.14. In some instances, we could have identified more cost drivers than can be appropriately incorporated in the model. This situation could arise through engineering judgement identifying a significant number of drivers which all yield reasonable coefficients when introduced in the model. In such instances we will use a composite cost driver which pools a number of related drivers into a single cost driver.

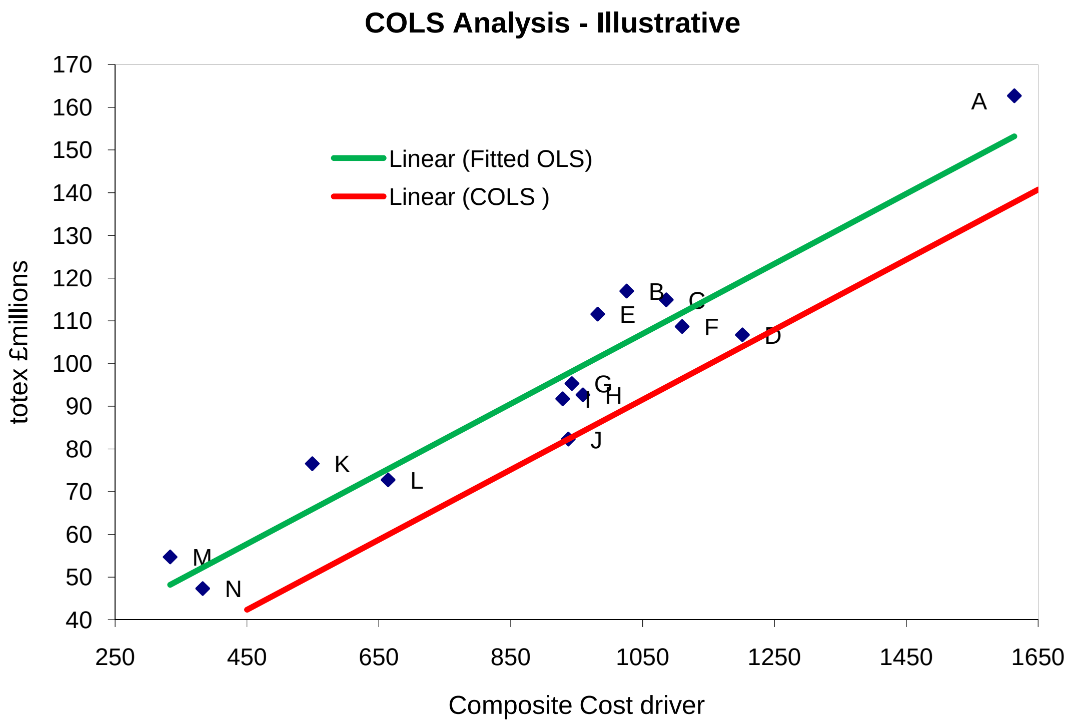
Estimation techniques

4.15. We have considered a number of estimation approaches including the three frontier-based techniques, corrected ordinary least squares (COLS), data envelopment analysis (DEA) and stochastic frontier analysis (SFA).

4.16. We have come to the conclusion that COLS is the most appropriate method particularly because it provides more reliable estimates than SFA when applied to small sample sizes. Further, unlike the DEA technique, the regression based techniques that underlie COLS have statistical tests that enable us to verify the reliability of our estimates. . We therefore propose using COLS as the lead method, and to cross check the results using DEA.

4.17. COLS involves estimating a regression using ordinary least squares (OLS) technique, and then correcting the regression line (ie average cost line) by shifting it to the position of most efficient company as illustrated in Figure 4.1.

Figure 4.1 Illustration of COLS



4.18. Our international comparator data is likely to span a number of years. This could be suitable for the use of panel data techniques. Panel data models utilise data for two or more time periods, ie time-series panel data allowing more observations of the same set of companies to be incorporated in the analysis. Making use of this additional data and can provide better estimates of the impact of cost drivers on costs than is possible with only a single year's data. Better estimates of the impacts of cost drivers can be expected to provide better insights into the relative efficiency of the companies.

4.19. Panel data techniques that we considered included time fixed effect models, company fixed effect models and random fixed effect models. As time events such as industry wide shocks and changes in input prices may affect the cost outcome of companies, we propose to use the time fixed effect model also used in DPCR5. The time fixed effect model assumes that all cost drivers have the same effect in all years and also accounts for time specific effects through the use of time dummies.

Robustness of estimated results

4.20. We intend to apply statistical tests to provide an indication of the robustness of the modelling results and also indicate whether some of the outputs from the regressions might be biased and/or require an adjustment to avoid producing misleading results.

Drawing conclusions

4.21. The strength of the conclusions we draw from the benchmarking results will be dependent on our judgement of the limitations of the quality and comparability of the data. Totex benchmarking results will be used to inform our overall assessment of the business plans rather than applied mechanistically. However, we envisage providing initial totex results to TOs in conjunction with the release of the March strategy decision document. We will expect TOs to explain efficiency gaps and, where appropriate, how efficiency gaps will be addressed as part of their well justified business plans.

5. Direct operating expenditure

Chapter Summary
This chapter discusses the materiality of different areas of direct opex, and our approach to assessing direct opex and closely associated overheads using our toolkit of assessment techniques.

Question 1: Do you agree with our proposal to assess closely associated indirect operating expenditure alongside direct operating expenditure?
Question 2: Have we chosen the most appropriate mix of techniques from our cost assessment toolkit?

Introduction

5.1. Opex relates to the activities required to maintain and operate the transmission networks. Opex can be divided into:

1. controllable opex – these are the running costs of the business eg salaries and staff costs, materials, contractors, property costs, and so on. From an operational viewpoint, these can be subdivided into the two broad categories of direct opex (eg network asset inspections, maintenance and repair), and indirect opex (eg engineering support, IT, HR, finance, corporate costs etc).

   Indirect opex can be further divided into those costs that are required to support the overall business (business support) and those costs that support the operational activities (closely associated indirect costs).
2. non controllable opex – these are costs that the transmission companies have limited or no influence over, such as the transmission licence fee.

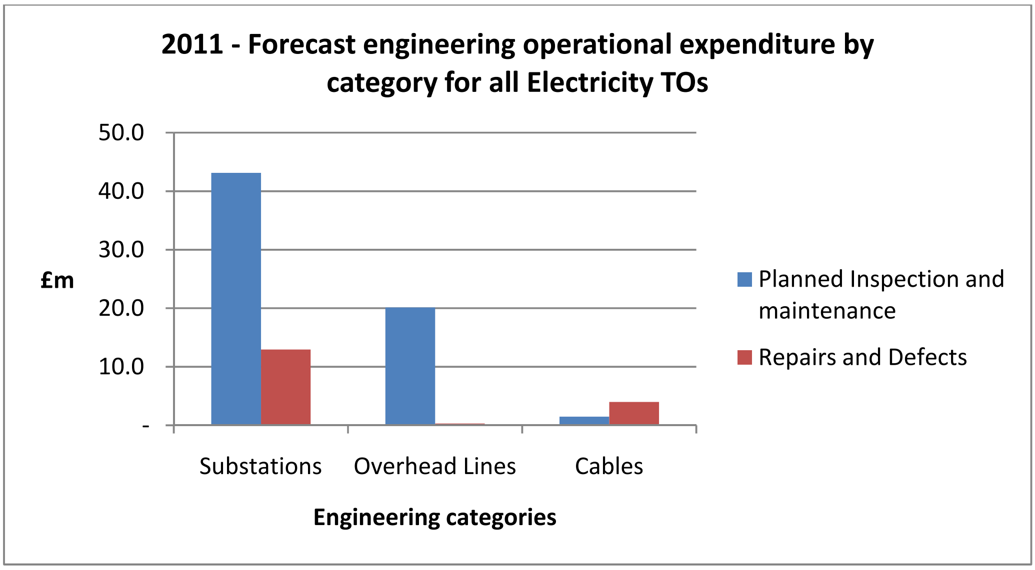
5.2. This chapter focuses on direct opex and closely-associated indirect costs (such as engineering support), and discusses potential methods for assessing these costs for RIIO-T1.

Background

5.3. Direct opex can be divided into planned work largely associated with maintenance tasks that are driven by asset management policies and technical standards, and unplanned work driven largely by faults on the network.

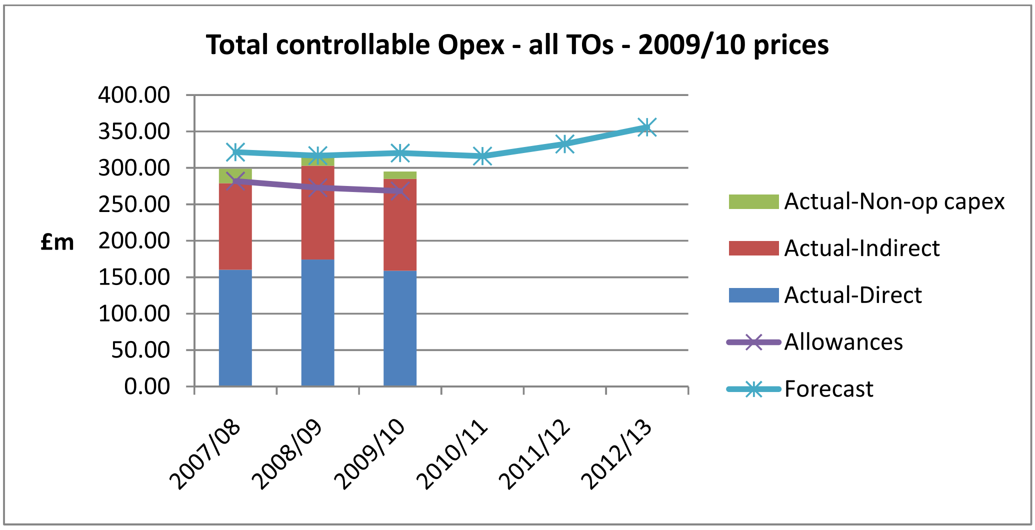
5.4. As shown below, planned work dominates expenditure for above ground assets.

Figure 5.1 - 2011 forecast engineering operational expenditure by category



5.5. Total controllable opex for both electricity and gas TOs, and the direct and indirect proportions are shown below. This graph includes non-engineering opex.

Figure 5.2 - Total controllable Opex - all TOs - 2009/10 prices



5.6. For RIIO-T1, we propose assessing closely associated indirect costs, such as design and work programming of operational and maintenance tasks together with the assessment of the TO's direct opex.

5.7. The principles underpinning RIIO have been incorporated into the proposed assessment methodology in the form of clear criteria for TOs who will be 'fast-tracked' through the assessment process. Additionally, the methodologies seek to align the opex assessment with secondary deliverables being proposed in safety and reliability.

Overview of assessment methodologies

5.8. Under the RIIO model our assessment of the outputs that network companies are required to deliver and the associated revenue requirements will be informed by the plans put forward by the network companies. Our assessment of the expected efficient costs required by a network company will be largely based on our assessment of the forecasts in the company's business plan. This approach places an onus on the companies to demonstrate that their forecasts are efficient both in terms of the volume of work that they are planning and the unit costs of delivery, and that their program of work is linked to outputs.

5.9. As outlined in the RIIO recommendations, we will seek to determine whether the proposed level of costs is consistent with the delivery of primary outputs over time and represents long term value for money. To ensure that companies' cost assessments are proportionate, a range of tools will be employed at various stages of the assessment process, including disaggregated benchmarking, historical trend analysis, unit quantity analysis, unit cost analysis, and expert review of the program and costs by our technical advisors.

5.10. Direct, and closely-associated indirect, opex will also be evaluated indirectly as part of the totex analysis discussed previously.

Historical trend analysis and disaggregated benchmarking

5.11. Both historical trend analysis and disaggregated benchmarking are likely to be applied in the initial sweep and in later detailed cost assessments.

5.12. Our trend analysis will look at expenditure incurred during prior periods, and any projected changes to historical expenditure. Where changes are proposed, we will look to the TOs to explain these changes in terms of changes to the outputs that are being delivered.

5.13. To inform our view on industry trends we also intend to examine recent cost movements in direct opex in closely related industries such as electricity distribution. This will help to inform our view as to whether any recent opex changes are anomalous to the TOs subject to the RIIO-T1 price control, or whether they represent a general trend in the industry as a whole.

5.14. We also intend to benchmark direct operating costs. As a minimum we would benchmark the GB TOs, but we may also be able to benchmark subsets of direct operating costs, such as those associated with 132kV assets, against distribution network operator (DNO) costs.

5.15. Due to the different reporting regimes, we are less confident of being able to effectively benchmark direct operating costs against overseas comparators. However, if comparable data is available we may do so.

5.16. Where a TO's expenditure is above anticipated levels we would expect the business plan to explain how this either reduces costs or risks overall, or how it supports improved outputs. We would also expect the TO to provide evidence that the increase represents the most efficient way to meet the changed outputs.

Quantity and unit cost analysis and expert review

5.17. For direct opex, we would also expect to apply similar trend analysis, comparison and benchmarking to unit costs and quantities.

5.18. In the initial sweep we would expect our analysis to be confined largely to planned works on key asset types, proportionate to the cost associated with those assets.

5.19. Where, following the initial sweep, we are not satisfied that the proposal demonstrates optimum outputs and value for money for consumers, we will undertake more detailed analysis. In these cases we would expect to undertake a more comprehensive review covering the majority of asset types in detail, and to include analysis of the costs and quantities associated with repairs and defects.

5.20. We anticipate that this more detailed analysis would be complemented by expert review of the TOs' key policies and practices, including asset management methodologies and processes for determining planned inspection and maintenance requirements and frequencies.

5.21. We may undertake a limited amount of more detailed analysis in particular areas as part of the initial sweep in order to verify evidence provided in business plans in support of proposed changes to costs or risks.

Closely associated indirect opex

5.22. Going forward we intend to take account of closely associated indirect costs, such as scheduling and planning costs, in our assessment of direct costs. We think this would be more appropriate where the levels of indirect costs are driven by activities in a particular area – for example, planned maintenance and expenditure.

5.23. We anticipate that, as now, we will conduct our analysis on direct costs, but that we would then apply a fixed overhead to either direct costs or to the quantity of activities in a particular area to recognise the indirect costs associated with that activity.

5.24. This will necessarily require the re-categorisation of some indirect costs, and we intend to seek expert advice from our technical advisors on the costs that should be categorised as closely associated with activities, and the percentage overhead that should be applied.

5.25. Other closely associated indirect costs, such as wayleaves administration and control centre functions may be better dealt with through fixed cost allowances. We anticipate providing more detailed guidance in our March Strategy decision document.

6. Indirect operating expenditure

Chapter Summary
This chapter summarises our initial thoughts on the methodology we may use in assessing indirect costs, particularly business support costs.

Question 1: Are there any additional business support costs that should be assessed?
Question 2: Have we chosen the most appropriate mix of techniques from our cost assessment toolkit?

Background

6.1. Indirect operating costs for transmission and gas distribution companies can be split into two categories, those costs that are required to support the overall business (business support) and those costs that support the operational activities (closely associated indirect costs).

6.2. Those costs falling into the business support category include information systems and telecommunications, property, human resources and training functions, finance and regulation, insurance, procurement, chief executive officer (CEO) and other corporate functions

6.3. The closely associated indirect cost category includes network policy (including research and development), network design and engineering, engineering management and clerical, wayleaves administration, control centre, system mapping and health and safety functions.

6.4. Historically, the treatment of closely associated indirect costs has varied between transmission and gas distribution. In transmission these costs have been assessed in total with business support costs. For RIIO-T1, we propose to assess these costs as part of direct opex and capex and they are therefore discussed in Chapters 5 and 7.

6.5. The RIIO-T1 and GD1 price controls provides an opportunity for assessment and benchmarking business support costs more widely across all networks. The chapter focuses on our proposals for assessment of these costs both within RIIO-T1 and GD1.

Assessment methodology

6.6. We consider that the same approach should be applied to the assessment of business support costs. We will run this as a single workstream covering both price reviews.

6.7. We intend, where possible to compare business support cost across the GDN owners and TOs. It may also be possible to compare costs with electricity distribution companies (DNOs) in some cases. We will also look to identify appropriate external comparators.

6.8. Some costs within the areas of business support are small in relation to other areas. We will therefore ensure that the assessment is proportionate to the magnitude of costs involved and the potential for savings. The overall assessment of business support costs should also be proportionate to the assessment of capex and direct opex.

6.9. The assessment of business support costs will use a range of techniques including; historical and forecast trend, regression analysis, comparison of costs between networks, expert review, and the use of external benchmark information. A mixture of these techniques will be used in the initial sweep and the more detailed analysis. Comparison of business support costs across all networks, TOs, GDNs and DNOs should also be possible using regression or other analysis.

6.10. When reviewing the business support costs in the initial sweep we will consider the costs in the following four groups: total indirect (business support) costs; information systems and telecoms; property; and other business support costs.

6.11. In the more detailed review we will go down to a greater level of detail where necessary.

Trend analysis

6.12. The historical trend analysis will look at performance against price control baselines and movements in costs over time. We will then look at the reasons and justification for changes in costs in the forecast period and how these are related to the outputs. We may also conduct a spot audit of a small sample of costs to inform our view on the robustness of the analysis.

6.13. In reviewing costs in more detail we will ask companies further questions. We will consider whether differences between companies are due to different business models being used and in sourcing / outsourcing decisions

6.14. Business support costs would be expected to follow similar trends across industries. We will examine trends in these costs for electricity DNOs to inform our view on transmission and GDN trends.

Regression

6.15. We will use regression analysis for both RIIO-T1 and GD1. We will use a panel data approach, where appropriate, using three years of historical data and forecasts.

6.16. We have started to look at regression analysis in this area using historical GDN data. The costs drivers we have considered include customer numbers and length of network, total direct costs, total assets from the regulated accounts (fixed and current) and employee numbers.

6.17. We will be carrying out further analysis in advance of the March strategy decision document to determine the appropriate driver or drivers to use

Expert review

6.18. We propose to use specialist consultants to assist in our assessment. It is likely this will be in two areas, information technology (IT) and property as these are two of the largest cost areas within indirect costs. We intend that indirect costs more closely associated with operational activities will be reviewed by the engineering consultants when assessing direct capex and opex.

6.19. We anticipate that the IT consultants will conduct a review that includes:

- comparing projected costs against historical costs and look for explanation of changes in the business plans
- examining information technology requirements
- analysing the companies' proposed IT investment plans
- examining proposed IT operations costs
- benchmarking costs against other firms with similar information technology needs
- comparing expenditure with other TOs, DNOs and GDNs.

6.20. We envisage that the same IT consultants will also examine the National Grid Electricity Transmission (NGET) and National Grid Gas (NGG) system operator IT using a similar approach. We expect that IT costs specifically related to engineering asset management systems will be reviewed by the engineering consultants.

6.21. Similarly the property consultants are likely to consider matters including the following:

- comparing projected costs against historical costs and look for explanation of changes in the business plans
- analysing the companies' proposed property plans
- examining proposed property costs
- benchmarking against other firms with similar property needs
- comparing expenditure with other TOs, DNOs and GDNs
- advising on appropriateness of property related costs required for network infrastructure.

External benchmark information

6.22. Various companies and consultancies produce benchmarking data for areas included within indirect costs. We will examine what data is available and may use such data to enhance our assessment of network companies. We are likely to use external benchmarking to assist us in forming a view for both the fast track and non fast track assessment processes.

7. Capital expenditure

Chapter Summary
This chapter examines our proposed methodology for assessing non load and load related expenditure and our proposed approach to previously funded works.

Question 1: Do you agree with our proposal to assess closely associated indirect operating expenditure alongside capital expenditure?
Question 2: Have we chosen the most appropriate mix of techniques from our cost assessment toolkit?

Non load related capital expenditure (NLRE)

Introduction and overview

7.1. NLRE relates to capex incurred to replace assets and to comply with environmental and safety legislation.

7.2. Under the RIIO model our assessment of the expected efficient costs required by a network company will be largely based on our analysis of the forecasts in company's business plan. This approach will place an onus on the companies to demonstrate that their forecast costs are reasonable and are linked to the delivery of outputs. We will look to the business plans to demonstrate that the total NLRE cost, planned volume of work and the unit costs of delivery are efficient.

7.3. We intend to use a range of techniques to assess the companies' forecasts in terms of the total level of NLRE required for the price control period and to establish an assumed profile of annual expenditure consistent with this. Whilst the onus will be on the companies to demonstrate that their forecasts are reasonable, our views in the initial sweep will be informed by our initial analysis. In particular, our initial views will likely be informed by the outcomes of historical trend analysis, and by quantity and unit cost analysis. We would expect business plans to pre-empt the outcomes of this analysis, and we will look to them to provide objective and verifiable reasons for material divergences in risk or cost outcomes.

7.4. The assessment tools will ultimately form the backstop if companies are unable to satisfy us that their plans are sufficiently justified.

7.5. This chapter sets out our proposed approach for assessing NLRE forecasts for RIIO-T1. Given the different asset management approaches in electricity and gas transmission we propose different approaches for these two sectors. The following sections discuss our proposed approach in each of these areas.

Historical trend analysis and disaggregated benchmarking

7.6. Historical trend analysis and disaggregated benchmarking are likely to be applied in the initial sweep and in later detailed cost assessments. Depending on the availability of and quality of comparator data, we may also choose to benchmark, NLRE or some of its sub-components.

7.7. As for direct opex, our trend analysis will look at expenditure incurred during prior periods, and any projected changes to historical expenditure. Where changes are proposed, we will look to the TOs to explain these changes in terms of changes to the outputs that are being delivered.

7.8. To inform our view on industry trends we also intend to examine recent cost movements in NLRE in closely related industries such as electricity distribution. This will help to inform our view as to whether any recent expenditure changes are anomalous to the TOs subject to the RIIO-T1 price control, or whether they represent a general trend in the industry as a whole.

7.9. We may also benchmark NLRE either as part of the initial sweep or in the later more detailed analysis. We may be able to benchmark between the GB electricity TOs, but may also be able to benchmark subsets of NLRE costs, such as those associated with 132kV assets, against DNO costs.

7.10. Due to the different reporting regimes, we are less confident of being able to effectively benchmark NLRE costs against overseas comparators. However, if comparable data is available we may do so.

Quantity and unit cost analysis

Electricity transmission

7.11. We intend to consider both the volume of asset replacement required and the efficient level of unit costs. We intend to draw on bottom-up analysis for projects of a sufficiently large scale. Bottom up tools will be applied to varying degrees at the different stages of our assessment.

7.12. We propose examining NLRE in five major asset categories: transformers and reactors, switchgear, overhead lines, underground cables and other NLRE.

7.13. Our view on the volume of assets required will be informed by:

1. Aged based modelling. We are working with the TOs to develop a simple and transparent survivor model to be implemented in Excel. More information on our proposed use of this model is given in Appendix 3.
2. Information provided by the TOs on secondary deliverables relating to asset health, criticality and replacement/risk priorities. We intend to ask the TOs to

outline volumes of asset replacement in their well-justified business plans based on secondary deliverables concerning asset health, criticality and replacement/risk priorities.

7.14. We will expect the companies to explain the differences between volumes based on survivor modelling and volumes based on both asset health and criticality.

7.15. Our views on unit costs will be informed by:

- expert advice
- historical costs
- cost comparisons between the TOs
- cost comparisons with related entities such as DNOs
- justification provided in the business plans.

7.16. We intend to engage with the network companies early in the price control review process to agree a consistent set of definitions of unit costs and we may seek expert advice on the best approach for achieving this. For example, definitions need to be clear on:

- transformers: transformer size, whether plinth and secondary equipment costs are included in the project
- overhead lines: extent of included work on conductors and fittings
- cables: the degree of tunnelling vs direct burying
- switchgear: the use of air insulated switchgear (AIS) versus gas insulated switchgear (GIS).

7.17. Changes in the efficient levels of unit costs over time caused by improvements in project delivery, technological innovation, procurement efficiencies and input cost changes should also be taken into account in the business plan.

7.18. Our analysis of unit costs will vary at each of the stages of assessment:

1. During the initial sweep, the onus will be on the businesses to demonstrate the efficiency of their unit costs. We would expect them to provide information on how their unit cost performance compares to their historical levels and market intelligence and clearly justify any differences between these and their forecast levels. We intend to seek expert advice on efficient levels of unit costs and would expect the businesses proposed levels to be consistent with these. We may also carry out a ‘spot check’ of a sample of material replacement projects for each TO.
2. For non-fast tracked companies, we intend to undertake a full and detailed assessment of their unit cost information. We intend to interrogate the differences between forecast unit costs, historical performance, any market intelligence presented by the businesses, our own comparisons and our expert advice. This is likely to involve us seeking further information from the businesses. We intend to also conduct more detailed bottom up analysis of a suite of significant and other projects.

7.19. We may adopt a more rigorous approach in particular areas as part of the initial sweep should we believe there is a need. For example, we may request our technical advisors to examine the veracity of claims that a particular driver resulted in differences between modelled quantities and quantities put forward by the TOs.

Losses

7.20. We believe that TOs should be encouraged to take the whole of life cost of losses into account when evaluating equipment tenders, especially for high loss equipment such as transformers and conductors, so that total costs to customers are minimised.

7.21. We intend to request TOs to explain the way that they take the cost of losses into account in their equipment purchases and project designs, and may require them to be explicitly taken account of in future. We also intend to examine the impact of minimising the sum of whole of life costs inclusive of losses on up-front equipment purchase costs.

Gas transmission

7.22. As with electricity, we intend to consider both the volume of asset replacement required and the efficient level of unit costs. We will also draw on bottom-up analysis for projects of a sufficiently large scale. These tools will be applied to varying degrees at the different stages of our assessment.

7.23. The main difference between our assessments of NLRE for gas transmission compared to electricity transmission is that we are less able to use an aged-based model in assessing NGG's forecast volumes. As a result, our view on the volume of assets will place greater emphasis on the ability of NGG to articulate the link between replacement volumes and asset condition and criticality. We may also apply a detailed review to a sample of specific and larger projects.

7.24. We intend to undertake unit cost analysis for the major expenditure areas. We intend to engage with the NGG early in the price control review to agree a consistent set of definitions of unit costs and may seek expert advice on the best approach for achieving this. We envisage that these will build on categories in the current Regulatory Reporting Packs (RRPs).

7.25. We believe that estimates of unit costs can be derived through a combination of historical information, expert advice and market intelligence. It may also be possible to benchmark project costs with projects undertaken elsewhere. In its well justified business plan we expect NGG to set out its evidence on how its unit costs have been determined, based on:

- historical information
- market intelligence
- site specific engineering knowledge and other influencing factors

- other significant factors.

Expert review

7.26. As noted above, we intend to seek expert advice on providing a consistent set of definitions for assets on which to base unit costs, and also on closely associated indirect costs.

7.27. We also intend to seek expert advice on the efficiency of NGG's proposed levels of unit costs. We will likely focus on major areas of expenditure in the initial sweep.

7.28. We intend to have expert review of the efficiency of costs for a subset of material projects. This will likely be on a sample basis only for the initial sweep.

7.29. We may also seek expert advice in specific areas where we have doubts about the veracity of outcomes and justifications provided in NGGs business plans.

Project by project review

7.30. We intend to seek expert advice on the efficient level of costs for a subset of representative schemes and large scale projects.

7.31. The scope of this review will differ between the fast track, where a proportionate sampling approach will be adopted to provide confidence that the TOs processes in developing costs result in efficient estimates, and more detailed cost assessment where, based on the outcomes of the initial sweep, we are not satisfied that this is necessarily the case.

Closely associated indirect capex

7.32. As with opex, going forward we intend to take account of closely associated indirect costs, such as scheduling and planning costs, during our assessment of direct capex costs. We think this would be more appropriate where the levels of indirect costs are driven by activities in a particular area.

7.33. We anticipate that, as now, we will conduct our analysis on direct capex costs, but that we would then apply a fixed overhead percentage to either direct capex costs or to the quantity of activities in a particular area to recognise the indirect costs associated with that activity.

7.34. This will necessarily require the re-categorisation of some indirect costs, and we intend to seek expert advice from our technical advisors on the indirect costs that should be categorised as closely associated with activities, and the level of fixed overheads that should be applied. We anticipate providing more detailed guidance in our March strategy decision document.

Load related capital expenditure

7.35. Our approach to load related expenditure volumes and uncertainty is set out in 'Supplementary Annex - Outputs and incentives.'

7.36. For load-related expenditure we intend to carry out some high level modelling based on capacity requirement but the nature of the expenditure means that we will likely be more focused on expenditure required at key boundaries and the costs of associated projects.

7.37. As with NLRE, we intend to take a view on unit costs informed through comparisons, market intelligence, benchmarking and by expert advice as well as the businesses' historical costs and justification for forecast proposals.

7.38. We also intend to also seek expert advice on the efficient level of costs for a subset of representative schemes. The scope of this review will differ between the fast track and more detailed cost assessment. We intend to draw on other cost assessment tools including bottom-up analysis for large-scale projects.

7.39. Our view on the cost of incremental boundary capacity will be informed by an assessment of the cost of projects that are available to deliver boundary capacity. It follows that the incremental cost of boundary capacity may differ for different boundaries.

Historical NLRE volumes and outcomes

Forecast volumes resulting from under delivery of replacement outcomes in TPCR4

7.40. In general, any approach adopted by us will be based on the premise that customer benefit is of paramount importance. In the TPCR4 ex post reviews, we intend to examine delays in asset replacement and load related expenditure and deferments of capex.

7.41. TOs should benefit from the incentives applying to efficient deferment that can be justified as being in the interests of consumers. However, deferment that increases risk to consumers or results in outcomes not being delivered the transmission network should not be rewarded through additional revenues in RIIO-T1.

7.42. Significant deferment has occurred during the TPCR4 period to date.

7.43. TPCR4 replacement quantities forecast by the TOs for the first three years of the price control, and out-turn for the corresponding period from the TOs' Regulatory Reports to Ofgem (historical three years up until the 2009-10 Regulatory Reporting Pack period) are shown in the tables below.

Table 7.1 - Summary of NGET NLRE activities

Asset Replacement Quantities	TPCR4 FBPQ forecast	Outturn	Variance	Reduction (%)
Transformer	41	30	11	27%
Switchgear	288	64	224	78%
OHL	760	293	467	61%
Fittings	3443	1892	1551	45%
Cable	46	17	29	64%

Table 7.2 - Summary of SPT NRLE activities

Asset Replacement Quantities	TPCR4 FBPQ forecast	Outturn	Variance	Reduction %
Transformer	10	9	1	10%
Switchgear	12	14	-2	-17%
Protection	81	42	39	48%
OHL	973	719	253	26%
Tower & Foundation	573	271	302	53%
Cable	141	78	64	45%

Table 7.3 - Summary of SHETL NRLE activities

Asset Replacement Quantities	TPCR4 FBPQ forecast	Outturn	Variance	Reduction %
Transformer	10	10	0	0%
Switchgear	32	20	12	38%
OHL	221	92	128	58%
Cable	3	10	-8	-300%

7.44. This section discusses, and attempts to define, what is represented by both efficient deferment and inefficient deferment. Several issues pertinent to this discussion are now considered in some detail.

Lifetime extensions

7.45. We would expect ever increasing levels of sophistication in asset management and the targeting of particular failure modes to result, on average, in longer expected asset lives.

7.46. Longer asset lives benefit customers through reductions in current and future replacement expenditure. Indeed, in our assessment at TPCR4, we anticipated that lower replacement quantities than those proposed by the TOs would be required.[8]

Increases in unit costs

7.47. In the final proposals for the TPCR4 price control,[9] cost increases and the associated cost risk, were allowed on an ex ante basis. The risk was allocated to the TOs and should not be passed on to consumers, as indicated in the following excerpt from Ofgem's TPCR4 final proposal:

"There are four main areas where we have made changes to our Updated Proposals. They are summarised below (expressed as a total change, relative to our Updated Proposals, for the period 2007/08 to 2011/12) and explained in more detail in the sections to follow:

- ***Capital expenditure:*** *an increase of £43 million resulting from changes to assumed unit costs for overhead lines, the estimated impact of future input cost increases, and our treatment of underground cable replacement."*

7.48. Passing on the impact of any additional cost increases is inconsistent with the ex-ante risk allocation, whereby the TOs have assumed price risk (and potential benefits). In a similar vein, allowing TOs to defer expenditure so that customers can fund price increases also undermines the efficiency incentive.

Business/cost cycle

7.49. Network operators should not be discouraged from efficiently deferring or bringing forward capex to take advantage of the business cycle, provided customers are not exposed to additional risk or costs.

7.50. To incentivise investment at the appropriate point in the business cycles without undermining efficiency incentives, investments brought forward or deferred should in our view be included in only one TO price control (except where such deferment arises from an efficiency improvement, such as an enduring life extension for a particular asset class, and therefore has no deleterious impact on risk or costs).

7.51. If this were not the case, TOs would, under current incentive rates, receive 1.25 times the cost allowance for each item of expenditure deferred into future periods despite delivering increased risks and/or costs to customers.

7.52. By allowing capex adjustments only once, the loss (capex brought forward) or gain (capex deferred) to the TO under the capex incentive in one period is offset in

[8] Transmission Price Control Review 4: Final Proposals at:
http://www.ofgem.gov.uk/Networks/Trans/Archive/TPCR4/ConsultationDecisionsResponses/Documents1/16342-20061201_TPCR%20Final%20Proposals_in_v71%206%20Final.pdf
[9] ibid

the subsequent period, without impacting the overall efficiency incentive or the allocation of unit cost risk.

Arbitrary deferrals

7.53. Deferrals that deliver increased risk or cost to customers (for internal TO financing or other reasons) should not result in replacements being included again in future capex allowances. This is because the TO has already benefitted from the capital adjustment incentive, without delivering any actual efficiency benefit.

7.54. Arguably, such deferrals should be subject to an additional disincentive, as customers may be exposed to increases in network risk or energy prices as a result of the TO's actions. The proposed Energy Not Supplied (ENS) incentive goes some way towards this, but the proposed secondary reliability deliverables around network risk proposed for RIIO-T1 provide a more comprehensive framework for non-load related capex going forward.

7.55. There is no specific proposal at this stage for applying an additional retrospective penalty for the TPCR4 period, but the calibration of ENS going forward will not include reliability reductions resulting from non delivery of asset replacement during TPCR4.

7.56. As discussed in 'Supplementary Annex - Outputs and incentives', we are considering how best to treat under delivery at the end of RIIO-T1 period.

Business plans

7.57. As part of the business plans we intend to request that TOs categorise their NLRE in terms of:

Reduced expenditure:

- expenditure no longer required
- expenditure delivered at a lower cost (either lower unit cost or lower cost design solution)
- expenditure deferred with minimal or no increase in risk and/or decrease in performance (ie enduring lifetime extension)
- expenditure deferred with increase in risk and/or decrease in performance (eg to take advantage of business/cost cycles)
- expenditure constrained (eg by planning delays) with an increase in risk and/or decrease in performance.

Increased expenditure:

- the impact of unit cost increases
- new expenditure not forecast previously
- expenditure advanced into the period.

7.58. All reduced replacement volumes would be captured in the above categories. Reduced expenditure which results in an increase in risk or a decrease in performance should not be rewarded through further allowances in RIIO-T1, as it did not deliver benefits to customers.

7.59. The asset life extensions inferred by expenditure deferred with minimal or no increase in risk should be fed back into the 'survivor' model to test the TO's suggested asset life profiles against actual life extensions, and to tune the model for future price controls.

7.60. Based on the responses to the information request, we should be better placed to determine the appropriate allocation of expenditures.

Historical load related volumes and outcomes

7.61. In principal a similar approach should apply to under delivery of load related outputs. We therefore intend to review whether cases exist where particular capacity outputs have been funded but where their delivery has been deferred.

7.62. As with non-load related expenditure, we want to ensure that customers are not left to pay incentives twice or more for delivery of the same output.

Assessment of historical capex

7.63. Our assessment of historical capex will aim to establish the level of expenditure that has been efficiently incurred and to identify what this has delivered in terms of outputs. The review of the TOs' capex performance in the historical period will also help us identify and understand issues that may impact on forecast capex. This work may include expert review using:

- variance analysis, which will examine the major factors influencing the difference between actual capex incurred and the projections made at the time of setting the last price controls
- high level review of the TOs' capex planning processes which will enable us to assess any areas of major concern that would impact on the level, timing and efficiency of capital investment
- detailed assessment, at both aggregate and individual sample scheme level, of the efficiency of actual capex incurred in the relevant historical periods.

Appendices

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Appendix 1 - Summary of questions

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CHAPTER: Six
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CHAPTER: Seven
Question 1: Do you agree with our proposal to assess closely associated indirect operating expenditure alongside capital expenditure?
Question 2: Have we chosen the most appropriate mix of techniques from our cost assessment toolkit?

Appendix 2 – Advantages and disadvantages of different approaches to total cost benchmarking

1.1. We set out advantages and disadvantages of our two potential methodologies in table A2.1 of this appendix.

1.2. Practical implementation of total cost benchmarking is hampered by the absence of a well defined asset value. The regulatory asset value (RAV) that we use is a regulatory construct, which does not reflect the yearly profile of physical asset values of the network operators. It would be inappropriate in determining capital consumption because:

- some of the distortions in RAV include different assets lives resulting in accelerated depreciation write-offs for some assets
- some assets' values are paid by connecting customers and these values are not reflected in RAV
- transportation differences between network operators is harmonised by adjusting the RAV and
- some non-capital atypicals have been written-off to RAV.

1.3. Importantly, capital consumption and in particular RAV and rates of depreciation are not determined in a consistent manner across jurisdictions.

1.4. Modern equivalent asset value (MEAV) is another measure of capital value used by us. MEAV is a measure of the replacement value of the network assets. However as this measure does not take into account their condition/age, it does not enable us to determine the current value of the network assets, and therefore makes it impossible to build a profile of how the network assets evolve over time to enable year on year differences to be interpreted as consumption.

Table A2.1 Advantages and disadvantages of total costs and totex

	Total costs	Total expenditure
Advantages	• Does not distort inter-temporal investment decisions. • Less sensitive to cyclical and atypical expenditure. • Results in an annualised measure of costs which if calculated accurately allows an assessment of efficiency in terms of the inputs being used by the business.	• Simple, no assumptions and easy to understand. • Costs are relevant in that they relate to the current state of technology, government regulation and environmental concerns. • Capex expenditures relating to previous periods are not reassessed along with current period expenditures. • Useful in the context of international benchmarking as differences in depreciation and cost of capital do not affect this measure of cost.
Disadvantages	• The amount attributed to any particular year is subject to discretion over the choice of depreciation profile and cost of capital. • The cost of capital is set in a regulatory context every price control period. The approach is subjective – it is unlikely that the cost of capital is constant over time during these periods. • If used in the context of international benchmarking, its sensitivity to different depreciation methods and cost of capital will likely render the cost measure non-comparable. • Some costs relate to earlier periods when the state of technology and operational rules, environmental concerns, and the level of efficiency of the operator are different from what they are now.	• Can distort inter-temporal investment decisions by setting artificial investment boundaries or horizons. • Can be sensitive to cyclical/atypical expenditures. • The number of years for capex data is subjectively determined and normally dictated by data availability.

Appendix 3 – Age-based modelling

A3.1 One of the drivers of network investment expenditure is the degradation of assets installed on the transmission network. In transmission, it is good practice to dispose of assets near the end of their useful lives, but prior to failure, to minimize the risk to network security and reliability. Where failure modes are benign and failure consequences are low, assets may be run to failure.

A3.2 The ability to forecast volumes of assets that will need to be disposed of (and subsequently replaced) in a particular period is an essential Asset Management technique for transmission operators. Volume forecasting will inform investment expenditure and network project planning.

A3.3 As the regulator, we are responsible for assessing the efficiency of companies' forecasts. To do this effectively, we need to have the necessary tools and methodologies to assess the operators' proposed network investment plans. In this section we discuss an assessment methodology based on historical and forecast age based modelling techniques.

Approach to modelling

A3.4 We are in the process of developing a simple, deterministic and fit-for-purpose forecasting model whose output volumes can be used to assess the asset replacement volumes proposed by the transmission operators (TOs).

A3.5 The development of the model is a collaborative process and is being done transparently in conjunction with the TOs.

A3.6 Some TO models use current actual asset condition in combination with degradation rates to forecast asset volumes but these require specific and extensive knowledge of the condition of individual assets. We support the use of condition and risk based models for replacement decisions. However, for us, a standard age based asset survivor model is most appropriate for the task of assessing the proposed replacement volumes of several TOs as it is less resource intensive, minimizes issues around information asymmetry and is able to be used for longer term quantity forecasting, which is particularly important given the length of the RIIO-T1 price control.

A3.7 This model applies a distribution curve representing the probability of an asset requiring replacement to the TOs' asset age profiles to derive forecast replacement volumes. The model's outputs are mechanically derived from the input data.

A3.8 Similar excel-based models have been used by us in previous price control reviews. Consistent with the approach in TPCR4 and DPCR5, the model used in RIIO-T1 will tune asset lives according to the TOs' actual historical replacement volumes.

A3.9 The impetus for reviewing (and possibly revising) asset lives stems from an aspiration to pre-emptively mitigate the risks associated with inaccurate asset life forecasts. The tuning process would be largely based on a backward-looking analysis of actual asset volumes replaced by the TOs during previous price review periods. If the actual volumes of replaced assets are significantly lower than those on which the revenue for that period was based, then this could point to either of the issues listed below:

1. The actual volumes replaced are materially lower than those that should have, in reality, been replaced (according to actual condition of assets in the network). In this case, the TOs will have created a back-log by postponing work that should have been carried out in a previous review period. The risk here is that these replacements will need to be 'caught up' in the upcoming price review period and will again be included in the forecast replacement volumes proposed by the TOs. Of course, this associated risk is not only financial, but also technical. If asset replacements are being unnecessarily postponed, resulting asset failures could place network security and reliability at risk.
2. The actual volumes replaced reflect real network requirements. In this case, the TOs would not be postponing work, but would be replacing assets according to actual condition (and within the parameters of their Asset Management Plans). Prolonged asset lives may reflect improved Asset Management techniques and increased network management efficiencies, however, the risk is that, going forward, asset lives remain unchanged in the TOs' models. This could result in proposed replacement volumes becoming over-inflated, thus not reflecting actual network requirements. The TOs would, in this scenario, be obtaining revenue based on replacement work that will more than likely not be completed in the period of concern. Any resulting additional profits would thus be due to inaccurate asset lives as opposed to further efficiency savings.

A3.10 Either of these scenarios could lead to inflated revenue allowances for TOs, and are thus undesirable. To ensure that neither is supported in RIIO-T1, an analysis of actual historical replacement volumes will be carried out. If significant discrepancies are found, any necessary adjustments to asset lives can be actualised prior to the application of our asset replacement model in assessing the TOs' proposed asset replacement plans.

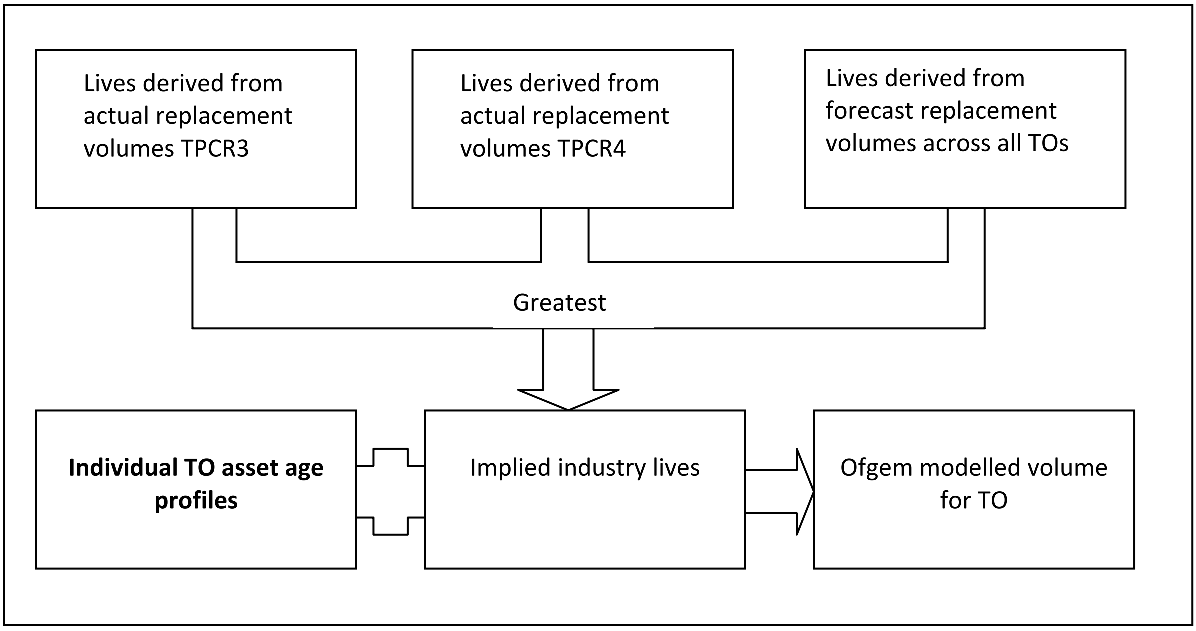
A3.11 In DPCR5, a model that calculated asset lives based on historical and forecast volumes of replacements was utilized. It made use of the 'Poisson' distribution to represent and then tune asset lives, where the standard deviation is equal to the square root of the mean life. In TPCR4, asset lives were tuned according to the type of distribution utilised by the TO. For RIIO-T1, a similar approach to that used in TPCR4 will most likely be adopted, however, the exact tuning methodology is still being developed.

A3.12 Regardless of the exact method used, however, it will be guided by the following actions:

1. derive the asset lives from actual replacement volumes during the TPCR3 review period
2. derive the asset lives from actual replacement volumes during the TPCR4 review period
3. derive the asset lives from the forecast replacement volumes across all TOs
4. in the absence of compelling arguments to the contrary, use the longest derived asset lives as the implied industry lives in our volume forecasting model
5. compare output volumes of our model to TO proposed replacement volumes for RIIOT1 business plan assessment.

A3.13 The above actions are summarised in Figure A3.1 below:

Figure A3.1 Modelling process



Approach to assessment

A3.14 We consider the proposed model to be a valuable tool in assessing asset replacement expenditure forecasts. However we understand that modelling has limitations where asset lives do not fully take account of factors such as specific TO issues, type faults, equipment obsolescence etc. Where a TO considers this to be the case, the onus will be on the TO to present compelling bottom-up evidence of the investment need.

A3.15 We envisage that the age based model will inform decisions at all levels of the assessment process, and will play a particularly significant role in its initial stages (ie during fast-tracking).

A3.16 Since a fast-track assessment will, by definition, be more rapid than a comprehensive review, it will require tools that are simple and accessible (a more granular analysis of individual projects is unlikely to be possible at that initial stage). The proposed asset replacement model fulfils these requirements.

A3.17 The model will support an initial, high level assessment, which will illuminate discrepancies in the replacement volumes derived by us and those proposed by the TOs. Where material discrepancies are found, we will seek to understand their causes and contexts. We intend to require TOs to provide detailed and robust information such as asset condition and criticality information, details of any identified type fault, comprehensive business plans etc. The model may also be useful in identifying marginal or unexpected asset replacement projects. These would be subjected to further scrutiny, and would need to be justified by the TO.

A3.18 Our approach to analysing replacement asset volumes will be proportionate to the intensity of scrutiny at the various stages of the assessment process:

1. During the initial sweep, the age based model will be run for electricity transmission and the results compared to the replacement volumes proposed by the TOs. In parallel with this, we will consider the TOs' justifications (if any) of any resulting discrepancies between these volumes and those that result from the businesses' secondary deliverables for asset health, criticality and replacement/risk priorities, and will attempt to resolve any minor concerns through questions and discussions. Our approach to asset risk as a secondary deliverable is discussed in detail in the chapter on Safety and Reliability in 'Supplementary Annex - Outputs and incentives.'
2. For gas transmission we intend to place greater emphasis on the ability of NGG to articulate the link between replacement volumes and asset condition. We may also carry out a spot check of one material replacement project for each TO.
3. A more detailed decision on whether a company will be fast tracked will require a more rigorous analysis of the company's business plan as well as due consideration to their performance at delivering outputs and value for money in previous price reviews periods. This stage may also see further spot checks on individual projects (both material and non material), as well as a high level review of the company's asset condition data.
4. For non fast tracked companies, a full and detailed analysis of Asset Management Plans and asset condition and criticality will be undertaken. Additionally, any significant and unjustified replacement projects that have resulted in material discrepancies with the age based model will be evaluated. Ultimately, if inconsistencies and differences cannot be resolved or justified in this manner, the outputs of our age based model will be used as the backstop on electricity transmission asset volume allowances for the RIIO-T1 price review period.