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RIIO|ED1

Strategy consultation for the RIIO-ED1 electricity distribution price control

Tools for cost assessment

Supplementary annex to RIIO-ED1 overview paper

Reference:	122/12	**Contact:**	James Hope
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		Email:	RIIO.ED1@ofgem.gov.uk

Overview:

The next electricity distribution price control, RIIO-ED1, 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 RIIO-ED1 review. This supplementary annex sets out our initial proposals for undertaking the cost assessment work. 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-ED1 Overview paper.

Associated documents

Strategy consultation for RIIO-ED1 - Overview
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConOverview.pdf

Links to supplementary annexes

- Strategy consultation for RIIO-ED1 - Outputs, incentives and innovation
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConOutputsIncentives.pdf
- Strategy consultation for RIIO-ED1 - Business plans and proportionate treatment
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConBusinessPlans.pdf
- Strategy consultation for RIIO-ED1 - Uncertainty mechanisms
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConUncertaintyMechanisms.pdf
- Strategy consultation for RIIO-ED1 - Financial issues
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConFinancialIssues.pdf
- Strategy consultation for RIIO-ED1 - Impact assessment
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConImpactAssessment.pdf
- Strategy consultation for RIIO-ED1 - Tools for cost assessment
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConCostAssessment.pdf
- Strategy consultation for RIIO-ED1 – Reliability and safety
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConReliabilitySafety.pdf
- RIIO-ED1 Glossary of terms
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConGlossary.pdf

Links to other associated documents

- Open letter consultation on the way forward for RIOI-ED1
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1LaunchOpenLetter.pdf
- Handbook for implementing the RIIO model
http://www.ofgem.gov.uk/Networks/rpix20/ConsultDocs/Documents1/RIIO%20handbook.pdf
- Electricity Distribution Price Control Review 5 (DPCR5) Final Proposals
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR5/Documents1/FP_1_Core%20document%20SS%20FINAL.pdf

Contents

1. Introduction

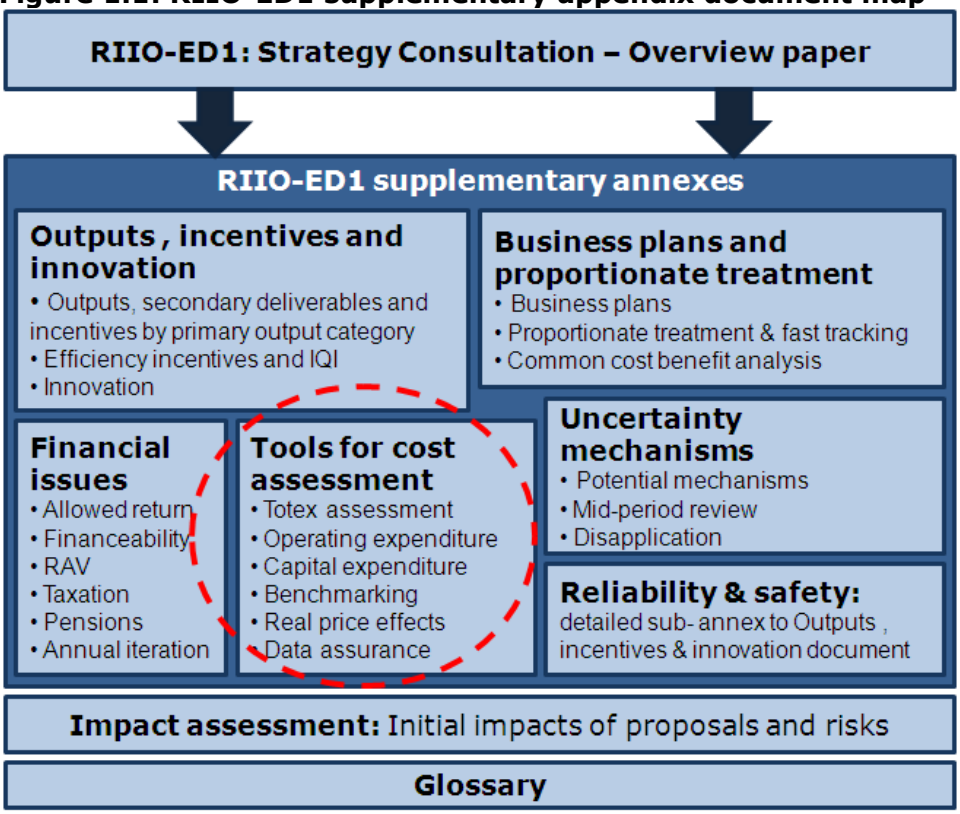
Chapter Summary

This chapter provides a brief introduction to this supplementary annex and sets out the document structure.

There are no questions in this chapter.

1.1. The electricity distribution price control review, RIIO-ED1, is the first electricity distribution review to be carried out under the new RIIO framework. We are consulting on the strategy for this review. This supplementary annex sets out our initial proposals for undertaking the cost assessment work. 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-ED1 Overview paper. Figure 1.1 below provides a map of the RIIO-ED1 documents published as part of this consultation.

Figure 1.1: RIIO-ED1 supplementary appendix document map



Links to these documents can be found in the 'Associated documents' section of this document

1.2. As detailed in the RIIO handbook[1], the RIIO price control will be set using a building block approach incorporating incentives to encourage distribution network operators (DNOs) to innovate, to deliver outputs and to achieve value for money for customers in the longer-term. The RIIO approach will be outputs-led in the sense that outputs feed into and influence all elements of the framework.

1.3. Our assessment of the outputs that DNOs are required to deliver and the associated revenue to be earned from customers will be informed largely by the business plans submitted by the DNOs. In its plan a DNO should set out what it intends to deliver for customers over time and what revenue it needs to earn from existing and future customers to ensure delivery is financed. For fast-tracked companies the cost allowances will be based on the first submission of their business plan.

1.4. The onus is placed firmly on the DNOs to justify their view of required expenditure across all activities. This also applies to areas where there may be minimal or no changes in costs from the previous price control period.

1.5. We would expect the DNOs to consider a range of options for delivering outputs and explain why their proposals are the best way forward. When making the case for their preferred proposal the DNO should demonstrate that it has considered the long-term costs and benefits of the most viable options. They will need to demonstrate that their proposals are lowest cost over the long-term.

1.6. This supplementary annex discusses the methods we propose to assess the costs proposed by the DNOs and the quality, robustness and objectivity of their supporting cost justifications. We have summarised our proposed method by activity area in Appendix 2.

1.7. We plan to ensure that our level of assessment of costs for each activity is proportionate to the magnitude of potential allowances. As a guide, the allowances awarded at the previous price control review (Distribution Price Control Review 5 (DPCR5))[2] to each activity are presented in Appendix 3.

1.8. In Chapter 2 we set out an overview of our proposed cost assessment approach. This approach is then discussed in more detail in the chapters that follow.

1.9. In Chapter 3 we discuss our proposed approach to totex benchmarking, which is a key component of the RIIO cost assessment method and was used in both RIIO-T1 and GD1.[3] It also includes a discussion on a middle-up model. In Chapter 4 we

[1] http://www.ofgem.gov.uk/networks/rpix20/consultdocs/Documents1/RIIO%20handbook.pdf
[2] This is the current price control which runs from April 2010 to March 2015.
[3] RIIO-T1 is the first transmission price control under RIIO (which will run from April 2013 to March 2021) and RIIO-G1 is the first gas distribution price control under RIIO (which will run from April 2013 to March 2021).

discuss our proposals to assess costs at a disaggregated level and total them to provide an alternative to the totex and middle-up models. Chapters 5 and 6 set out our proposed approach for Network Investment (ie capital expenditure). In Chapters 7, 8 and 9 we discuss our proposals for the component costs that comprise operating expenditure - Network Operating Costs (NOCs), Closely Associated Indirect costs (CAIs) and Business Support Costs (BSCs). We then discuss our proposed approach to regional and company specific adjustments (Chapter 10), Real Price Effects (RPEs) and ongoing efficiency (Chapter 11). Finally, Chapter 12 sets our proposals with regards to data assurance and compliance.

1.10. Throughout this document we have not used data to demonstrate past and projected future performance. Our intention is to provide this detail in the Strategy Decision paper in February 2013 to allow sufficient time to review the latest submissions from DNOs.

1.11. Some sections of the proposed cost assessment approach are more developed than others at this stage. Where this is the case we have provided more detail on particular proposed approaches.

2. Cost assessment overview

Chapter Summary

This chapter provides an overview of our proposed approach to assessing efficient costs for RIIO-ED1.

Question 1: Do you consider our overall approach to cost assessment appropriate and what changes, if any, would you propose?
Question 2: Do you think Ofgem should take into account poor historical performance in its assessment of business plans, and if so, how?

Introduction

2.1. One of the core elements of RIIO-ED1 is to assess the efficient level of costs that will enable DNOs to carry out their activities and deliver an appropriate level of outputs. This will ensure that they provide a secure and reliable supply at an efficient cost while making sure that any new assets they install meet customers' needs into the future, taking into account how those needs might change.

2.2. This chapter sets out at a high level our proposed approach to assessing efficient costs, with the remaining chapters providing the detail.

2.3. We established a number of working groups with DNOs and other stakeholders in order to inform our approach to RIIO-ED1. The Cost Assessment Working Group (CAWG) has been the main forum at which we have discussed and developed our approach to cost assessment set out in this document. We will continue to hold these groups in the coming months to facilitate ongoing dialogue and transparency.

2.4. Full details of all RIIO-ED1 workings groups, including minutes and slide packs can be found on our website.[4]

DPCR5 approach

2.5. At the DPCR5 we set baselines for DNOs' individual activities based on an efficiency review of historical performance and an assessment of their forecasts. We used a range of techniques across the individual activities to assess the most efficient costs – in many cases the most efficient unit costs. These techniques

[4] http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/working-groups/Pages/index.aspx

included regression analysis and expert review. We relied heavily on benchmarking across DNOs at a disaggregated level.

2.6. There are a number of lessons we have learned from DPCR5 that we will take into account for RIIO-ED1. These include:

- Early and continuous partnership working and communication with DNOs and other relevant stakeholders to ensure transparency.
- The early conclusion on cost methodology, cost assessment models, cost drivers, benchmarks and cost assessment templates.
- Trialling models early in the process. We intend to test the models with the data submitted in July 2012.
- Building a tool-kit of models to cross check and validate DNO business cases and our results.
- The reduction of over-complicated and extensive use of regressions.
- Proposing a high bar of evidence before considering any company specific or regional adjustments.
- Putting in place a committed RIIO-ED1 team with selective use of consultants to ensure that knowledge and experience is embedded within Ofgem.
- Being clear with DNOs about our expectations on how any data issues with the submitted business plans will be dealt with.
- That all data is submitted via a secure internet based data collection method.

2.7. In addition, it is important to recognise the significant work completed by Ofgem and the DNOs in developing the Regulatory Instructions and Guidance (RIGs) before, and in the first two years of, DPCR5. We believe that the RIGs form a basis on which to build on for RIIO-ED1; entirely new RIGs do not need to be developed for RIIO-ED1.

RIIO-ED1 toolkit approach

2.8. For RIIO-ED1, we propose to use a toolkit of methodologies that builds on the extensive work in DPCR5 and that of the working groups, as well as incorporating the latest thinking from RIIO-T1 and GD1, where appropriate.

2.9. Our proposed RIIO-ED1 toolkit comprises:

- total expenditure (totex) econometric benchmarking
- disaggregated econometric benchmarking
- asset condition and criticality data (discussed in Chapters 5 and 6)
- asset replacement modelling (discussed in Chapter 6)
- trend analysis
- expert review
- individual project review
- cost benefit analysis (CBA) (discussed in the 'Supplementary annex - Business plans and proportionate treatment')
- uncertainty mechanisms where there is insufficient information or too much uncertainty in costs to set an ex ante cost baseline for the price control (this is detailed in the 'Supplementary annex – Uncertainty mechanisms').

Econometric modelling

2.10. Econometric modelling that tests different levels of aggregation and different drivers should provide useful information in order to assess DNO comparative efficiency. We propose that this comparative analysis will be carried out at both a totex level and at the individual activity level. We propose that totex benchmarking will be undertaken at an aggregated level to gauge overall business efficiency. More specific benchmarking will be applied at a disaggregated level to assess the individual activities that form capital expenditure (capex) and operating expenditure (opex). We consider that the relevance of the disaggregated modelling will be less during the fast-track than the non-fast-track assessment process, but it will provide a useful cross-check to support the totex approach during our initial sweep of the DNOs' business plans.

2.11. We propose that the benchmark for all costs will be set by the upper quartile (UQ) level of efficiency, unless we specifically state otherwise.

2.12. The above techniques can be applied to both historical and forecast costs. When assessing the business plans in July 2013, for all models we intend to use actual expenditure from the first three years of DPCR5 (2010-11 to 2012-13), the forecast expenditure for the remaining two years of DPCR5 (2013-14 and 2014-15), and the forecast data for RIIO-ED1.[5]

2.13. We will be looking to DNOs to justify their forward cost movements in their projections. These forward cost movements must account for RPEs and ongoing efficiency (discussed in Chapter 11).

2.14. Where there are errors or anomalies in the data, we propose that this data is removed from the modelling before the benchmarking exercises. While it is prudent for Ofgem to give DNOs the opportunity to amend minor errors (that may have a material impact), in our view this should of necessity be time limited. Consistent and/or significant errors in the data submitted to Ofgem will be taken into consideration when we assess the business plans. It is likely to be extremely difficult for DNOs that consistently submit erroneous data to Ofgem to be fast-tracked. Our views on data assurance and compliance are discussed in further detail in Chapter 12.

2.15. DNOs have already been given the opportunity to put forward potential econometric models for our consideration. Through the CAWG we aim to finalise the cost assessment models early in the price control review process. We will make sure the models we use are visible.

Trend analysis

[5] For an eight year price control this will be from 2015-16 to 2022-23 and for a nine year price control will be from 2015-16 to 2023-24.

2.16. We propose to consider historical performance in a particular activity, groups of activities and at a totex level. If a DNO has performed poorly in previous price controls that will be taken into account in assessing the likelihood of it delivering its business plan under RIIO, with the consequence that there may be a higher hurdle to satisfy before we would recommend that it should be fast-tracked. This may require, for example, robust evidence of what it will achieve or extra means of holding itself to account, such as accepting a higher penalty rate for failing to deliver outputs.

2.17. The onus is on DNOs to explain how historical performance translates into future performance. If they are currently under-spending in a particular activity without delivering the intended outputs, any further costs allowances in the next period must be clearly justified.

Expert review

2.18. To help determine efficient costs, we propose to use expert review in certain areas. We intend to use it in areas where cost drivers are not obvious or not easy to model, in areas where comparisons to other industries are relevant and for activities that no DNO currently undertakes.

2.19. Based on these principles and on discussions at the CAWG we propose using expert review for Property Management costs and Information Technology and Telecoms (IT&T) costs (operational and non-operational). This is discussed in more detail in Chapter 9. It is also likely that we will make use of expert and technical support in some areas, for example in auditing our proposed cost assessment models.

2.20. In undertaking any expert review, Ofgem are mindful that the analysis should be proportionate to the costs being analysed and targeted at those areas which meet the above principles. We will make use, where appropriate, of the expert reviews conducted in RIIO-T1 and GD1.

2.21. Expert review is currently being used by those DNOs who are collectively developing a totex econometric model. This development is at an early stage, as discussed in Chapter 3.

Individual project review

2.22. As was the case in DPCR5, in RIIO-ED1 we will consider specific project proposals put forward by DNOs. Where these projects are of a high value we would expect to see a full cost benefit analysis.

2.23. For example, as in DPCR5, we propose to continue to use scheme-specific review for n-2 reinforcement expenditure forecasts (see General Reinforcement (EHV and 132kV n-2)).[6] These schemes would be locationally and technically specific and are not amenable to benchmarking. Due to the relatively low number of schemes likely in RIIO-ED1, individual project review should remain feasible.

[6] General Reinforcement (extra high voltage (EHV) and 132kV n-2) refers to general reinforcement schemes that are designed to maintain P2/6 compliance during a second circuit outage. P2/6 is Engineering. More information about Engineering Recommendation P2/6 is available in the Distribution Code: http://www.energynetworks.info/storage/dcode/dcode-pdfs/Distributionper cent20Codeper cent20vper cent2018r1.pdf

3. Total expenditure analysis and middle-up model

Chapter Summary

This chapter sets out our proposed approach for undertaking totex assessment in RIIO-ED1. It also considers the use of, and our approach to, a middle-up model.

Question 1: Do you agree with the use of totex benchmarking for RIIO-ED1 and what are your reasons?
Question 2: Do you agree with the use of a capital expenditure as opposed to capital consumption approach for measuring total costs?
Question 3: Do you agree with using a similar approach to the top-down model used in RIIO-GD1, considering the adjustment for regional factors, the use of a composite cost driver, and the use of the upper quartile (UQ) to determine efficient costs?
Question 4: Do you believe it is appropriate to use a middle-up totex model and if so, do you agree with following the principles of the GD1 approach?
Question 5: What level of disaggregation do you believe is appropriate for the middle-up model to provide a useful comparator to the top-down totex model?
Question 6: How do you believe lumpy expenditure should be treated in totex modelling?

Introduction

3.1. Total expenditure (totex) is defined as capital expenditure (capex) plus operating expenditure (opex). As noted above, we propose that this approach will be an important part of our toolkit to assess the DNOs' business plans, alongside more disaggregated benchmarking and qualitative assessment including expert review.

3.2. Discussions with the DNOs at the CAWG revealed support in principle for adopting totex benchmarking, although concerns were raised about how it would be applied in practice and the construction and robustness of the totex model.

3.3. Totex benchmarking as an assessment tool has the advantages of allowing a simple comparative analysis across DNOs. It is largely immune to trade-offs between activities and reporting differences, and avoids cherry picking between different models. We also believe that totex encourages DNOs to deploy the lowest cost solution to a problem over time, be that a capex or an opex solution. For example, to improve the performance of an asset, and achieve the outputs set, a totex approach encourages a DNO to consider different types of asset intervention such as asset replacement, heavy or light refurbishment, inspections and maintenance (I&M) and replacement on failure (replacement or trouble call expenditure). When looked at in isolation, it is argued that more disaggregated benchmarking will encourage the most efficient delivery of a specific activity, rather than assessing whether that cost is the least cost to customers overall in terms of delivering outputs. For example, where once efficient expenditure on asset replacement might have been favoured,

refurbishment or demand side response (DSR) may replace these as the most efficient solution to achieve the same output. Such an approach is in the interests of customers.

3.4. Totex benchmarking as an assessment tool has the advantages of allowing a simple comparative analysis across DNOs. It is largely immune to trade-offs between activities and reporting differences, and avoids cherry picking between different models.

3.5. We also believe that totex encourages DNOs to focus on the lowest cost solution to a problem over time in order to deliver the outputs set. For example, to improve the performance of an asset, under a totex approach a DNO is more likely to consider different types of asset intervention activities such as asset replacement, refurbishment, I&M, replacement on failure and DSR. A more disaggregated approach simply encourages the lowest cost to a particular asset intervention in isolation. While a DNO may have the lowest comparative cost for asset replacement, asset replacement may not be the lowest cost solution to a particular problem. Such a solution-based approach is in the interests of customers.

3.6. One of the key criticisms of totex benchmarking is that the model will be limited to a few cost drivers, leading to a less intuitive relationship between cost drivers and costs. Selecting the appropriate cost drivers is critical. At this stage, from discussions at the CAWG meetings, we believe this challenge is surmountable and consider that totex will form a vital element of the toolkit that we would use to assess efficient costs in RIIO-ED1.

Total costs techniques

3.7. There are two approaches for measuring total costs. The first measure is opex plus a measure of capital consumption (analogous to depreciation). The second is annual opex plus capex (totex). In line with the approach in RIIO-T1 and GD1, we propose to use totex as this is a simple measure of the amount of cash being spent. It is also simple to understand and the costs relate to the current state of technology, government regulation and environmental concerns, and the DNOs' levels of efficiency.

Totex, middle-up and disaggregated models

3.8. Discussions to date at the CAWG meetings have resulted in a totex model currently being developed with the support of external consultants. A middle-up model is also being developed by one of the DNOs. These are still at the early stages of development but we propose to adopt a toolkit approach to totex by making use of the totex model and the middle-up model, and comparing this to the disaggregated, bottom-up model (discussed in Chapter 4).

3.9. We believe that the use of different modelling approaches provides valuable means of assessing DNOs' comparative efficiency. For example, the top-down model

will allow us to identify those DNOs that are more efficient at an aggregate level but there are issues in terms of identifying appropriate drivers, given limited degrees of freedom. The bottom-up, activity-level analysis not only provides a different totex result for comparative purposes, but will also enable a richer model specification. That is, we can take into account a greater number of potential factors to explain costs. The middle-up model will strike a balance between ensuring that we consider trade-offs between cost areas and allowing a richer model specification than the top-down model.

3.10. We propose to carry out our initial totex cost assessment using three approaches:

- A top-down (a single totex model) approach, which uses aggregate totex costs in a single regression.
- A middle-up (an aggregated totex model) approach, which comprises a number of regressions separate regressions, one for each of the group activity (see paragraph 3.24). We will calculate the totex efficiency scores as a ratio of total actual costs to the aggregated estimated costs of the separate regressions.
- A bottom-up (an aggregated totex model) approach, which comprises a number of regressions separate regressions, one for each of the activity (see all activities listed in Appendix 3). As with the middle-up approach, we will calculate the totex efficiency scores as a ratio of total actual costs to the aggregated estimated costs of the separate regressions.

3.11. We propose to rank each of the DNOs across each of the above approaches.

3.12. To ensure a transparent process, we will continue to work in partnership with the DNOs to develop all three proposed models. We propose to review and test each in detail using the data that we have available. These include the actual expenditure from DPCR5 to date (2010-11 and 2011-12), the forecast expenditure for the remaining three years of DPCR5 (2012-13 to 2014-15), and the forecast data for RIIO-ED1.

3.13. Models based on historical data have the benefit of being based on actual data. [7] Estimating models using forecast data would allow us to take into account DNOs' views on how costs will change over the RIIO-ED1 period.

3.14. In interpreting the three models' results, we will consider the full range of information in determining our efficiency adjustments including our benchmarking, analysis provided by the DNOs and the quality of the evidence that they prove. This may be a simple average across the model or it may be a weighted average. This weighted average may differ for the fast-track and the non-fast-track assessments. Ultimately our approach would depend on our detailed assessment of the merits of each model.

[7] This is assuming that the historical data is accurate.

3.15. Following an in-depth review, we would then adopt, adapt or reject each model. Should we reject all or some of the models, we would develop our own. This would be done in an open and transparent manner.

3.16. Our initial thinking on each of the totex and middle-up proposed models is outlined below, with the disaggregated model discussed in Chapter 4.

Totex model

3.17. The top-down model is considered as a 'true' totex model and the one most in line with the vision set out in the RIIO handbook. [8] While still in development, it would define what activities should be included from the cost base and develop a composite cost driver. The efficiency score for each DNO would be calculated as follows:

3.18. As noted above, we propose to draw on learning from RIIO-T1 and GD1. In RIIO-GD1 there are a number of elements of the top-down totex approach that we are minded to adopt in RIIO-ED1, as detailed below:

- The use of a single regression model to assess the efficient level of controllable totex.
- The adjustment of costs for regional and company specific factors before being subjected to the regression analysis.
- The exclusion of uncertain costs in the regressions (for example smart metering costs).
- Rolling forward the base year costs to take account of real input price growth and ongoing efficiency (based on frontier shift). This is discussed in more detail in Chapter 11.
- Defining efficient costs as those costs equal to the UQ level of efficiency. The use of the UQ rather than the frontier will acknowledge that part of the difference in costs across the DNOs relates to factors other than the DNOs relative efficiency (ie statistical error).

3.19. Further details on the approach used in RIIO-GD1 can be found in the 'RIIO-GD1: Initial Proposals – Supporting document – Cost efficiency'.[9]

3.20. While the top-down model is still in the early stage of the development for RIIO-ED1, and therefore it is difficult to be firm on the exact components, we welcome views on following a similar approach to RIIO-GD1.

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[8] http://www.ofgem.gov.uk/networks/rpix20/consultdocs/Documents1/RIIO%20handbook.pdf
[9] http://www.ofgem.gov.uk/Networks/GasDistr/RIIO-GD1/ConRes/Documents1/GD1per cent20Costper cent20Efficiencyper cent20Initialper cent20proposalsper cent20270712.pdf

Middle-up model

3.21. The middle-up model is a more disaggregated approach to the top-down totex model.

3.22. In GD1 the middle-up model comprised three separate regressions for opex, totex and repex (replacement expenditure). Like the top-down model, normalisations and regional adjustments were made at the disaggregated cost activity levels and then costs were aggregated to total opex, capex and repex. The efficiency score was calculated as follows:

3.23. The modelled costs were based on the UQ of the aggregate of opex, capex and repex costs.

3.24. In the end, the RIIO-GD1 middle-up model was not used as it provided very little difference to the totex model. At this stage we are proposing to develop a middle-up model at a more disaggregated level than capex and opex to truly provide an alternative approach. For example, it may be at the following group activity level:

- Network Investment – Load Related Expenditure (LRE) split by:
  - primary network - £ per load index (LI)
  - secondary network
- Network Investment – Non Load Related Expenditure (NLRE) split by:
  - £ per output
  - non output NLRE
- Network Operating Costs (NOCs)
- Closely Associated Indirect Costs (CAIs)
  - substantially fixed costs
  - substantially variable costs
- Business Support Costs (BSCs).

Modelling principles

General considerations

3.25. We outline some important principles that we would propose all models (including the disaggregated model discussed in Chapter 4) consider:

- Activities that are common to all DNOs should be included. Those exclusive to one or a few DNOs should be excluded.
- Consideration should be given to potential trade-offs between two or more activities (for example spending more on remote switching which should reduce fault costs). Where there are trade-offs, the significant activities should be included.

- A totex model should be neutral to the relevant in-sourcing and outsourcing positions of the DNOs.
- A totex model should be normalised to account for:
    - inherited characteristics of a network (for example overground versus underground networks)
    - factors beyond the control of the DNO.
- Any regional costs adjustments (as discussed in Chapter 10) and normalisation adjustments should be applied before benchmarking. This will ensure that the costs are consistent across the industry and that we benchmark DNOs on a comparable cost basis. These adjustments will be made at the disaggregated activity levels, before being aggregated to the totex level. The adjustments then need to be reversed post-regression to determine the allowances for individual DNOs.
- Totex benchmarking should be applied both at the individual DNO level and the group level. This will take account of those costs which are fixed and can be shared across a DNO group.

Cost drivers

3.26. Critical to all benchmarking models is developing appropriate costs drivers and composite cost drivers. There are a number of key principles that we believe should govern this.

- In the top-down totex and middle-up approaches, the composite cost drivers should reflect predominant activities. This is due to the fact that there will be fewer cost drivers in a top-down totex model and middle-up model than in a bottom-up model.
- Where possible, the cost drivers should be able to differentiate between efficient delivery of activities and non-delivery. For example, a simple cost driver based on network scale (Modern Equivalent Asset Value (MEAV)) may reflect a large proportion of the cost base but may not necessarily make that differentiation.
- The cost drivers must consider both the fixed and variable elements of a DNO's cost base.
- The models should test the sensitivity and statistical significance of the proposed drivers.
- Composite cost drivers should be considered with careful attention given to what cost drivers are combined and the relative weighting given to each.
- Cost drivers should be based on efficient costs and not actual costs.

Lumpy expenditure

3.27. In the CAWG, DNOs raised concerns regarding the lumpy nature of capex and the effect that this would have on totex benchmarking. We acknowledge that any totex model would have to take account of lumpy expenditure. This may involve excluding some costs before benchmarking and then including them afterwards or smoothing expenditure over a longer period by using a moving average. The

approach in RIIO-GD1 was to use a seven year moving average to smooth the capex.

3.28. Further technical detail on our preferred econometric approach (to the totex, middle-up and bottom-up models) is discussed in further detail in Appendix 4.

4. Disaggregated model

Chapter Summary

This chapter sets out our proposed approach for undertaking disaggregated, bottom-up assessment in RIIO-ED1.

Question 1: Do you believe it is appropriate to use a bottom-up, disaggregated model to compare with the totex model results?
Question 2: Do you agree with our approach to disaggregated, bottom-up model?

Introduction

4.1. The bottom-up model is an alternative approach to the top-down totex model. It undertakes benchmarking at a disaggregated level and sums all the disaggregated analysis to give a total value. It does provide a sense-check to the top-down and middle-up totex models.

4.2. This chapter provides a short introduction to the disaggregated model with the following chapters providing the detail by specific activities.

Bottom-up model

4.3. Initial thinking on this approach is again similar to the RIIO-GD1 approach to disaggregated analysis. That is to split the cost activities into two groups. The first is those cost activities with identified cost drivers that can be included in the regressions. The second is those cost activities where it is not possible to allocate cost drivers (ie non-regression).

4.4. For the activities with identified cost drivers an efficiency score is calculated by aggregating all the actual costs and dividing it by the aggregate of the modelled costs. For those activities where no cost driver can be allocated, a benchmark for each activity is calculated with use of technical consultants or specialist expertise.

4.5. The UQ allowance is calculated as the sum of regression activities modelled costs and the sum of each non-regression cost activities allowance. Each DNO would then be benchmarked accordingly.

4.6. In RIIO-GD1 seven regressions were undertaken. It is likely that there would be more regressions for the bottom-up model in RIIO-ED1 (noting the proposed level of disaggregation for the middle-up model).

4.7. The advantages of this model is that for each activity there is a cost driver that is more aligned to each activity and that each non-regression has been subject to specialist technical assessment.

4.8. In addition, some of the DNOs are also developing a further bottom-up model. It is largely based on disaggregated unit cost rather than regression analysis but offers an alternative means of carrying out the bottom-up analysis. The DNO model is disaggregated even further than our proposed approach to bottom-up regression analysis. We propose that our bottom-up analysis will be a mixture of regression analysis for relevant activities and other quantitative/qualitative analysis for other activities. We will not benchmark at the UQ for individual activities as this creates a danger of cherry-picking, or in other words, an artificially efficient benchmark company. Instead we will sum the actual and the modelled costs to calculate an overall efficiency for each DNO and then calculate the UQ benchmark.

5. Network Investment – Load Related Expenditure

Chapter Summary

This chapter details our approach to assessing load related Network Investment, covering Connections, Diversions, Wayleaves and Easements, General Reinforcement, Fault Level Reinforcement and specific High Value Projects (HVPs). Collectively these areas accounted for £2,513m or 16 per cent of DPCR5 cost allowances.

Question 1: Do you agree with our proposed approach to how the specific building blocks that make up load related expenditure interact as well as which categories are proposed to be included in a load related reopener?

Question 2: Which of the three options set out for assessing connection-related costs within the price control do you feel is the most appropriate and why? Please reference the following in your answer:

a) the gross cost assessment adjusted for net-to-gross ratio or just on the Distribution Use of system (DUoS) funded reinforcement costs
b) the most appropriate cost driver for connection reinforcement costs: Meter Point Administration Numbers (MPANs) or number of connection projects
c) the most appropriate approach for assessing cost of low volume high cost (LVHC) connections.

Question 3: Which of the three options set out for assessing wayleaves and diversionary-related costs within the price control do you feel is the most appropriate and why?

Question 4: For all general reinforcement, is it feasible for the DNOs to provide specific scheme lists based on commonly agreed demand scenarios in RIIO-ED1?

Question 5: For all general reinforcement, do you think that reinforcement specifically relating to generation should be separately assessed from demand-related reinforcement?

Question 6: Do you agree with our proposed modelling approach to cost assessment of n-1 reinforcement schemes, specifically in relation to the two proposals for the Load Index (LI) delivery as outlined in Chapter 4 in the 'Supplementary annex – Reliability and Safety'?

Question 7: Do you agree that expenditure on secondary network reinforcement is no longer highly correlated with localised economic growth?

Question 8: Do you believe that it is feasible and appropriate to set definitions and unit cost(s) for the following:

a) the conversion of wayleaves to easements and injurious affection payments;
b) load related interventions on the secondary network; and
c) fault level reinforcement?

Question 9: What is the most appropriate funding mechanism for load related expenditure on the secondary network?

Introduction

5.1. Network Investment refers to direct capital investment in DNO networks to maintain or improve network reliability and maintain compliance with relevant legislation and industry obligations. For the purposes of this document, we have split Network Investment into two groups – Load Related Expenditure (LRE) which is discussed in this chapter and Non-Load Related Expenditure (NLRE) which is discussed in Chapter 5.

5.2. In DPCR5 total Network Investment accounted for £7,576m or 48 per cent of all DPCR5 ex ante allowances. LRE accounted for £2,513m and NLRE £5,063m in allowances.[10] LRE refers to expenditure relating to the following activities:

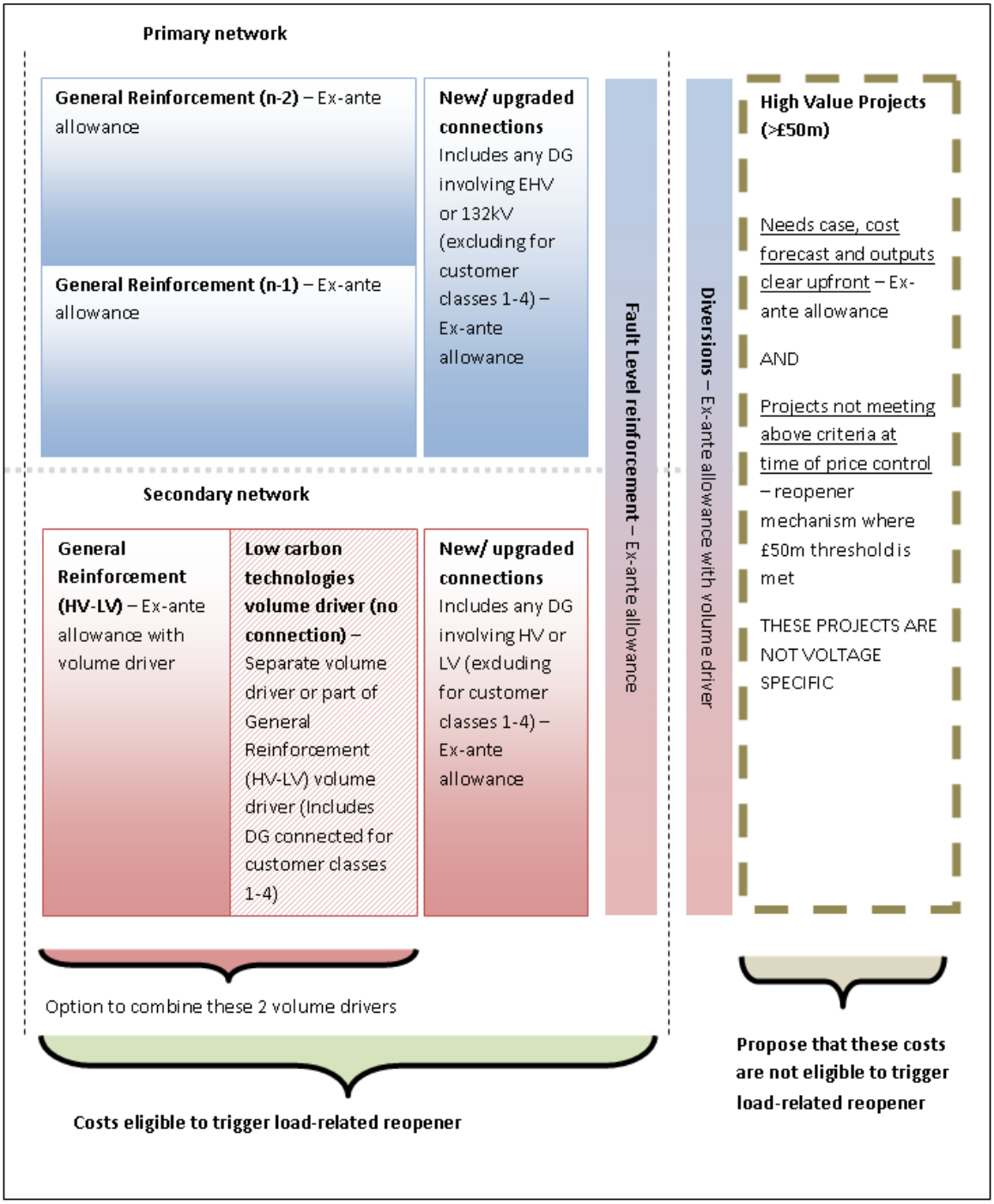
1. Connections
2. Diversions, Wayleaves and Easements
3. General Reinforcement
4. Fault Level Reinforcement
5. High Value Projects (HVPs).

5.3. We recognise that not all HVPs are load related but given that that majority in DPCR5 to date have been we feel it is best covered in this chapter.

5.4. Figure 5.1 provides an overview of our proposals for how the specific building blocks of LRE will fit together to form the funding mechanisms for each relevant activity across the primary and secondary networks.

[10] Note: all allowances quoted in this document as in 2011/12 prices.

Figure 5.1: Overview of proposed LRE building blocks for RIIO-ED1



5.5. Our general preference is to set ex ante baselines for each area of activity, wherever feasible. This provides certainty and transparency for both companies and customers and prevents any unforeseen volatility in bills. It also provides much stronger incentives for the DNOs to deliver value for money as if they outperform the

allowances they will retain a share of the benefits through the efficiency incentive rate and potentially outperform our base assumptions for Return on Regulatory Equity (RORE).

5.6. As can be seen in Figure 5.1, in the specific context of load related activities, at the primary network level (132kV - EHV assets) we propose to continue to rely on ex ante funding. We consider that there is sufficient certainty around the scope of work that a DNO will be required to deliver within the RIIO-ED1 period to allow the funding needed to deliver their outputs to be largely set upfront. These costs will be driven by the long-term network development and are therefore less likely to be sensitive to fluctuations in economic growth or other external customer dynamics. However, we propose to continue with a reopener mechanism if expenditure is or is likely to be greater than 20 per cent above or below our cost baselines. We also plan to have a reopener mechanism for certain high value projects (HVPs) (above a proposed threshold of £50m) where it is not practical to set an allowance at the price control review because there it too much uncertainty over either the needs case and/or the likely costs associated with the project.

5.7. In the case of the secondary network (network assets up to but not including 22kV), the scope of work is likely to be more sensitive to uncertainty and external dynamics. The work required at these voltages is driven more directly by customer behaviour in terms of the volumes of Distributed Generation (DG), connections and the levels of low-carbon technology installed across the network. As a result, across the different elements of the proposals we put forward in this chapter relating to the secondary network, we propose to utilise volume driver mechanisms to ensure that the funding DNOs get is driven by an accurate reflection of the level of work actually required on the network.

5.8. The diagram also sets out the key funding boundaries and interactions that we propose to maintain throughout RIIO-ED1. These are discussed below.

Boundaries between funding mechanisms for DG, Connections and other load growth not attributable to specific connection customers

Classed as load growth (fully socialised)

5.9. As set out in the 'Driving sustainable networks' chapter of the 'Supplementary annex - Outputs, incentives and innovation', we propose that any reinforcement costs relating to the connection of any DG by domestic customer classes one to four should be socialised across the full DNO customer base and funded through the price control. We propose that, alongside any other secondary network reinforcement that does not relate to a specific new or upgraded connection projects, these costs should be subject to a low carbon technology volume driver which is technology neutral. The options for this mechanism are explained in the relevant section of this chapter on General Reinforcement (HV-LV).

Classed as a connections project (subject to Cost Apportionment Factor (CAF) rules)

5.10. We propose that all installations of low carbon technologies delivered through a specific new or upgraded connection project should be subjected to the connections funding mechanism, as set out in the Connections section of this chapter. We also propose that the reinforcement costs associated with the installation of any DG by customers not in customer classes 1-4 should also be subjected to this mechanism. This will prevent potential boundary issues around which funding mechanism will cover the installation of these devices where installed as part of a connection project. Furthermore, it will prevent any requirement to split out the relevant costs and allocate them to the specific mechanisms. This picks up some of the key lessons learnt regarding the operation of the DG mechanism and connection arrangements in DPCR5.

Low-carbon vs. conventional loads

5.11. Our preference is to combine the low carbon technology cost category with General Reinforcement (HV-LV) and jointly subject them to a single volume driver based on the work involved in accommodating either type of load. This would help ensure that we do not discriminate between how we fund the accommodation of different load types. However, as set out in the relevant section of this chapter, we are also considering, and consulting on an approach that separately assesses low carbon loads from conventional loads.

High Value Projects (HVPs)

5.12. We propose to differentiate between HVPs that are identified ahead of the RIIO-ED1 period and those where the requirement is unknown at the time of compiling the RIIO-ED1 business plan, or where the necessary needs case and outputs are not sufficiently satisfied to allow for specific up-front funding.

5.13. We propose that HVPs that pass the proposed threshold of £50m, including those that are load related, and are funded through an ex ante allowance are likely to be subject to specific output requirements. These would not form part of the LRE that is eligible to trigger the load related reopener, but may need to be considered in the assessment of a DNO's proposed adjustment where they have triggered the reopener.

5.14. We propose that HVPs that are not funded through an ex ante allowance, and where expenditure levels pass the proposed £50m threshold would be subject to the HVP reopener. Further details of our specific proposals can be found in the relevant section of this chapter and the 'Supplementary annex - Uncertainty mechanisms'. This is similar to the Strategic Wider Works mechanism for RIIO-T1.

Load related customer contribution true up

5.15. We propose to true up the difference between the value of relevant expenditure forecast to be funded by connection customers and the actual amount that is contributed. This true up will be carried out across the LRE as a whole, rather than just the connection cost categories. This should ensure that, from an allowed revenue perspective, DNOs are neutral to whether a specific level of reinforcement is carried out as part of a connections project or fully funded by the DNO.

Load related reopener

5.16. With the exception of diversionary works and HVPs, we propose to include all the cost categories in this chapter in the overall load related reopener. Further details on the relevant mechanics and criterion of this reopener are set out in the 'Supplementary annex - Uncertainty mechanisms'.

Connections

5.17. Connections, with the exception of any connection of a DG to domestic customer classes 1-4, refer to the provision of new or upgraded network exit points to new or existing customers. The upgrading of a network exit point refers to increasing the capacity available to an existing exit point or allowing an existing exit point to feed a supply onto the network where it previously could not. Connections are delivered through connection projects carried out by a DNO, an independent distribution network operators (IDNO) or an independent connections providers (ICP).

5.18. The provision of connections received a significant amount of focus in DPCR5. Against a backdrop of low levels of customer satisfaction and DNO market dominance, Ofgem sought to encourage the further development of competition and improved service. This was pursued through the introduction of headroom for competition on price through regulated and potential unregulated margins on connections work alongside new guaranteed standards to ensure satisfactory delivery for customers. In the interest of creating headroom for competitors rather than rewarding poor performance, the margins were only allowed on connection work that third-party providers could compete for at the time. These connection services, as defined in special condition CRC 12 of the DPCR5 Electricity Distribution Licence, were classified as excluded services and are not funded through the price control.

5.19. Further details of the policy developments within connections for RIIO-ED1 can be found in the Connections chapter of the 'Supplementary annex – Outputs, incentives and innovation'.

5.20. Where reinforcement is required at a higher voltage to increase the capacity available to meet the connecting party's requirements, the costs are shared between the connection customer and the DNO customer base. The customer will contribute a percentage of the efficient costs of the reinforcement in line with the percentage of the new level of capacity they will have available to them under their connection agreement. The remaining efficient increase in capacity will be funded by the DNO customer base through the price control allowance. Alongside the policy

developments identified above, a great deal of work was done to more accurately capture the connections work that DNOs carry out on an annual basis in DPCR5. This should provide more robust cost information to use for assessing forecast expenditure levels in RIIO-ED1.

5.21. As a result of the work undertaken at DPCR5, the reinforcement carried out as part of a connection project, which is funded by the DNO customer base, is the only part of a connection that is directly funded through the price control. The rest of the connection project is funded in full by the connecting customer.

5.22. At DPCR5, allowances for connections were set at the gross level (the total cost of the project before any adjustment is made for customer contributions) and then adjusted by Ofgem based on a DNO assumption on the percentage of this gross cost that would not be funded by the connecting party. This assumed net to gross ratio will be adjusted at the end of DPCR5 to align with the DNO actual ratios.

5.23. For the setting of baseline allowances for the gross cost of connections, the connections market was split into two categories:

1. **High volume low cost connections (HVLC).** These connection costs were subject to a volume driver mechanism. The gross unit costs were subcategorised into three types; small scale, other low voltage (LV) and LV with high voltage (HV). The initial baseline was set for each DNO by multiplying the DNO forecast volume of exit points for each type by the specific benchmarked unit costs for the provision of an individual exit point.
2. **Low volume high cost connections (LVHC).** These connection costs were assessed through analysing connection costs and volumes over time, reviewing large schemes in progress and assessing third-party market penetration levels, as this allowance included third-party adopted connection costs.

5.24. Further details on how volume drivers can mitigate uncertainty can be found in the 'Supplementary annex - Uncertainty mechanisms'.

5.25. A breakdown of how the DPCR5 connection market segments fit into these two connection categories is shown Table 5.1.

Table 5.1: DPCR5 connection cost assessment by market segment

Market Segments	HVLC: volume driver			LVHC: evidence based ex ante allowance
	Small-scale	Other LV	LV with HV	
Single service LV connection	✓			
Small project demand connection (LV)	✓			
All other LV (with only LV work)		✓		
LV end connections involving HV work			✓	
HV end connections involving only HV work				✓
LV end connections involving EHV work				✓
HV end connections involving only EHV work				✓
EHV end connections involving only EHV work				✓
HV or EHV end connections involving 132kV work				✓
132kV end connections involving only 132kV work				✓

5.26. In principle, we are comfortable with the approach taken at DPCR5. We propose using a volume driver again for RIIO-ED1. We have identified some amendments that can improve the output from our analysis and feel it is worthwhile exploring these in the lead up to the February Strategy Decision document.

5.27. One potential drawback of running a volume driver based on the provision of exit points is that the number of exit points provided as part of a scheme will not necessarily be the principal cost driver for incurring reinforcement costs. It is conceivable that a housing project connecting numerous LV MPANs through some HV reinforcement would cost an equivalent amount to a single commercial LV MPAN connection also involving HV reinforcement. For this reason we intend to consider linking some of the connections cost assessment process with the approach taken for general reinforcement.

5.28. Once the general reinforcement modelling (see paragraphs on General Reinforcement below) has been completed, and with the assistance of the detailed DPCR5 annual reporting, we should have a good idea of the relative costs of providing capacity across the higher voltages. We could use this information to set a per project market segment specific unit cost for reinforcement for the LVHC connections and then apply a similar approach to DPCR5 in terms of correcting for differences between forecast and actual performance.

5.29. Alternatively, it might be more appropriate to put in place a volume driver mechanism where a benchmarked unit cost for each market segment is set. This benchmarked unit cost would be set based on the gross cost of the reinforcement work and the latest view of customer contributions and could be adjusted for the

actual customer contributions. This approach could be put in place from the information provided in the detailed connection reporting that has been in place on projects that were quoted for once DNOs passed the relevant systems and process audit requirements.

5.30. Within the context of RIIO-ED1, our approach to assessing the cost of connections will have to factor in the likely costs of maintaining compliance with Engineering Recommendation G5/4 that relates to network harmonics. In the context of likely increases in low carbon devices, the allocation of harmonic to connection customers is likely to become increasingly relevant. We would encourage industry to develop a more common approach to this area.

5.31. By the beginning of RIIO-ED1, it is our intention to allow for distribution use of system (DUoS) funding to be transferable to ICPs in order to allow them to compete for the reinforcement element of connection projects as well as the fully funded customer element. We see no reason why, in terms of cost assessment for RIIO-ED1, projects that involve reinforcement work that is completed by ICPs should be treated any differently from those where this work is completed by the DNO.

Costs assessment for connections – options for consultation

- Option 1: connection cost assessment approach same as per DPCR5
    - HVLC connections operate within volume driver against exit points provided
        - small-scale LV and other LV benchmark unit cost set using UQ benchmark unit cost
        - LV involving HV benchmark unit cost set using UQ benchmark unit costs
    - LVHC connections operate as an ex ante allowance based on detailed review of proposals.
- Option 2: connection projects within each of the metered market segments operate as a volume driver with a benchmarked unit cost of reinforcement set for a project within each segment. The means of setting this benchmark would have to reflect the relative uniformity or non-uniformity in costs across DNOs.
- Option 3: combination of approaches:
    - connection projects involving primary network reinforcement based on £ per mega volt-ampere (MVA) of capacity added as benchmarked through general reinforcement modelling
    - remaining connection projects operate in volume driver as detailed in either Option 1 or 2 above.

5.32. Our preference would be Option 3 as this allows for higher voltage reinforcement work to be funded in line with equivalent work that is carried out as general reinforcement whilst allowing the funding for the more uniform HVLC connections to flex in line with the volume of projects that materialise.

Diversions, Wayleaves and Easements

5.33. DNOs are funded for the unavoidable costs they incur for both the securing of necessary access to private land and rerouting network where such access cannot be secured. Under special licence condition CRC 15 of the DPCR5 electricity distribution licence, where these costs are incurred as a direct result of a new fully customer-funded connection, or specific customer request for a diversion, these costs are to be treated as relating to an excluded service and passed on in full the relevant party. Where such costs are efficiently incurred as part of a DNOs network investment or from the conversions of wayleaves to easements, they are funded through the price control.

5.34. For the purpose of assessing the appropriate funding for the different elements of these price control funded activities, we have grouped them as follows:

- Conversion of wayleaves to easements and injurious affection payments
- Diversions due to wayleave terminations
- Diversions due to New Roads and Street Works Act (NRSWA).

5.35. Across all the price control allowances for DPCR5, £372m was set as a baseline for carrying out these activities. This amounted to two per cent of total DPCR5 allowances and five per cent of Network Investment. Further details on the expenditure categories and initial thoughts on our approach to assessing each of these cost categories is provided below.

5.36. The conversion of wayleaves to easements relates to the changing of the terms of access to a private landowner's property from an annual rental price for access and reasonable compensation to a permanent right of access from a one-off payment.

5.37. Injurious affection payments refer to compensation payments made to owners of nearby land for claims against the impact of local DNO assets on land value due to loss of visual amenity and fear of the effects of electromagnetic fields.

5.38. In both cases, the DNO will need to negotiate an appropriate level of compensation with the land owner or their representative. We expect DNOs to secure the relevant access, be it through compensation or diversion, at the lowest cost to network customers.

5.39. A diversion due to wayleave termination refers to where a DNO is required to move assets due to them being located on land that they no longer have permission to enter under the terms of a wayleave.

Proposed RIIO-ED1 approach

Conversion of wayleaves to easements and injurious affection payments and diversions due to wayleave terminations

5.40. In determining the level of funding that a DNO receives for the conversion of wayleaves to easements and injurious affection payments, we need to consider a number of factors.

5.41. As explained in the introduction to this chapter, where possible, it is our preference to set ex ante baselines to provide certainty to both DNOs and customers and whilst proving more transparent and stronger incentives to improve efficiency. The sizeable under-spend from DNOs in the early part of DPCR5 and the clear relationship between expenditure and the number of claims that will require a resolution in RIIO-ED1 means we are also considering the use of a volume driver. This would set a benchmarked cost for the resolution of a claim and then adjust DNO funding by this much as the number of claims completed increases through the price control period.

5.42. However, it is also important that the relative costs of settling a claim versus triggering a diversion are also considered. Operating separate volume drivers on both of these cost categories could lead to a perverse situation where a DNO is incentivised to trigger a diversion rather than settle a claim with a land owner. Activating a relatively low-cost diversion could cost end customers more than paying a relatively large amount to secure an easement, but could theoretically benefit the DNO.

5.43. For example, the benchmarked unit cost of converting a wayleave to an easement is £50 and the benchmarked unit cost of a diversion is £200. If faced with the option of paying a relatively high easement cost of £75, or carrying out a diversion for £150, the diversion would cost customers more but the DNO would benefit relative to the unit cost set.

5.44. The three options that we are considering for assessing costs relating to wayleave and diversion works are as follows:

- Option 1: two volume drivers; one for conversion of wayleaves to easements and injurious affection and one for diversions. The unit costs would need to be based on the benchmarked cost of covering the relevant payments and legal fees.
- Option 2: ex ante baselines set based on historical cost data and forecast developments in the number of claims over time.
- Option 3: ex ante baselines set based on historical cost data with a volume driver based on benchmarked unit cost that can be triggered where the volume of claims is significantly higher or lower than set out in the business plan.

5.45. Of the three options outlined above, our preference is to set an ex ante allowance based on historical cost data and forecast developments in the number of

claims during RIIO-ED1. The relative sizes of the costs involved once costs are disaggregated to the different voltage levels are very small and lacking in uniformity. To develop a specific uncertainty mechanism for them would not be commensurate with the level of expenditure likely in RIIO-ED1.

Diversions due to NRSWA (New Roads and Street Works Act 1991)

5.46. Diversions due to NRSWA refers to diversionary work that is required as a result of the New Roads and Street Works Act. For the purposes of cost assessment for the price control this refers to diversions due to NRSWA that are not directly funded by customers.

5.47. We propose that these costs should also be funded through an ex ante allowance derived from historical cost data and forecast developments in the number of claims over time.

5.48. We welcome views on our proposals for the funding for Diversions, Wayleaves and Easements. We would also like to receive views on whether the cost assessment for diversions due to wayleave terminations should remain separate to the work undertaken for setting the funding for the conversion of wayleaves and injurious affection claims. We also welcome views on whether the complexity of a volume driver would be more appropriate.

General Reinforcement

5.49. General Reinforcement is defined as work carried out on the network in order to enable new load growth (both demand and generation) which is not attributable to specific customers. At DPCR5 General Reinforcement accounted for £1,299m of allowances set, which made up eight per cent of the total cost baselines set, and 17 per cent of total Network Investment.

5.50. General Reinforcement cost assessment can be broken down into three separate areas based upon the likely cost drivers:

1. General Reinforcement (EHV and 132kV n-2)
2. General Reinforcement (EHV and 132kV n-1)
3. General Reinforcement (HV and LV).

5.51. For absolute clarity, General Reinforcement, for the purposes of setting allowances for RIIO-ED1, includes the practical alternatives to reinforcement for accommodating demand growth, such as demand-side response schemes.

General Reinforcement (EHV and 132kV n-2)

5.52. General Reinforcement (EHV and 132kV n-2) refers to general reinforcement schemes that are designed to maintain P2/6[11] compliance during a second circuit outage. As these schemes tend to be lumpy, expensive and technically sophisticated in nature, they have traditionally been excluded from Ofgem's load related modelling and individually assessed. We believe that this is still a sensible approach to take in RIIO-ED1.

5.53. As RIIO-ED1 sees the movement to a longer price control period, it is likely that there will be an increase in the number of schemes that will require review. Additionally, the new fast-track process reduces the amount of time available to carry out the review. For this reason, we would need to develop a suitable approach for the fast-track review of the n-2 schemes. Where practical, through the annual cost visits in October and November 2012, we will be looking for evidence on the robustness of DNO load profiling and the strength of their approach to assigning costs to these projects. From this point we will consider whether it is appropriate to carry out a further review of relevant schemes currently in the design stage that are likely to be implemented in RIIO-ED1 before the formal business plan submission. This would not form part of the formal assessment process of the DNO business plans, but should be helpful in directing DNOs on how best to justify their expenditure. It would also allow us to develop a more proportionate approach for the fast-track review process in time for the February Strategy Decision.

5.54. We propose to allow DNOs to identify specific schemes that they forecast to be undertaken where demand or generation levels exceed their base forecast. The funding for these schemes will likely have particular trigger points or conditional outputs deliverables applied.

General Reinforcement (EHV and 132kV n-1)

5.55. General Reinforcement (EHV and 132kV n-1) refers to general reinforcement schemes that are designed to maintain P2/6 compliance during a first circuit outage. This work and relevant costs are tied to the Load Index (LI) secondary deliverable. For this reason, our approach will need to be compatible with the potential approaches outlined in the Load Index chapter of the 'Supplementary annex - Reliability and Safety'.

5.56. In terms of the potential options we put forward for the LI for RIIO-ED1, we believe that the two-stage load modelling used for both of the last two electricity

[11] More information about Engineering Recommendation P2/6 is available in the Distribution Code: http://www.energynetworks.info/storage/dcode/dcode-pdfs/Distributionper cent20Codeper cent20vper cent2018r1.pdf

distribution price controls, referred to as DPCR4[12] and DPCR5, is still an appropriate tool for assessing the costs of general reinforcement.

5.57. The model first benchmarks the average DNO ratio of capacity (MVA) forecasted to be added by DNO nominated schemes to the network to the forecast MVA growth in maximum demand at these sites. The model then uses the modern equivalent asset value (MEAV) of each DNO network to benchmark the ratio of cost of new capacity added to the historical MEAV value of the capacity already in place. This process should give a high level view of where DNOs are proposing to add more or less capacity relative to demand growth than their peers and relative to their own approach for DPCR4 and DPCR5. Additionally, it should provide a view on the relevant efficiency of the costs of DNO capacity while also factoring in the long-run historical characteristics of the long-term £ per MVA level.

5.58. These two points reflect the two key relationships relating to reinforcement: how much capacity is being added relative to the expected demand growth and how much this capacity costing. These relationships remain critical regardless of how the LI will function, and are the relationships that should be referenced by DNOs to justify their reinforcement forecasts.

5.59. For the more detailed assessment process that will be followed for those DNOs that are not eligible for fast-tracking, we would also look to review elements of individual schemes through the asset replacement new-build unit costs.

5.60. We propose to allow DNOs to identify specific schemes that they forecast to be undertaken where demand or generation levels exceed their base forecast. The funding for these schemes will likely have particular trigger points or conditions applied. This could also allow Ofgem to distinguish between reinforcement projects where the design work is already in place and the project is ready to be delivered, from those that are likely to be looked at in detail towards the latter part of RIIO-ED1.

5.61. Once the baselines have been set, the level of loading risk removed as set out in the DNO business plans will determine the LI secondary delivery requirement for the RIIO-ED1 period. Where it is ultimately determined that a DNO has not met its LI deliverable through under-delivery, the arrangements for penalising it for under delivery against RIIO-ED1 targets could take a form similar to the penalty arrangements agreed for network outputs at DPCR5. This would mean making downward adjustments to RIIO-ED2 [13]revenue allowances – with any appropriate penalty or reward adjustment applied – based on the achieved level of performance, as determined through Ofgem assessment. Another option would be to take the DNO's agreed load index position at the end of RIIO-ED1 as the starting point for ED2. So, for example, if found to have failed to meet its targets in RIIO-ED1 it would be required to fund the shortfall between its forecast and what it actually delivered.

[12] This is the fourth electricity distribution price control which ran from April 2005 to March 2010.
[13] RIIO-ED2 refers to the Electricity Distribution Price Control that will directly follow RIIO-ED1. Provisionally it will run from 2023-2031.

General Reinforcement (HV-LV)

5.62. Historically, General Reinforcement on the secondary network (HV and LV) has been a relatively small and predictable area of expenditure for DNOs. Expenditure levels have consistently been shown to correlate highly with local economic growth. However, due to the relative uncertainty around the level of uptake of low-carbon devices and DG during RIIO-ED1 and the unknown implications for LV reinforcement, we have looked to review our approach to cost assessment for this area.

5.63. As detailed in Figure 5.1 in the introduction to this chapter, the assessment of costs relating to general reinforcement for HV and LV assets and the costs of accommodating low carbon technologies could either be grouped together and assessed on the basis of the type of work required, or separately assessed. Our preference would be to combine the categories where possible to prevent any unintended boundary issues. If we were ultimately required to separately assess conventional general reinforcement, we propose to use the approach adopted at DPCR5, which based funding on localised economic growth.

5.64. As part of the wider low carbon challenges facing the industry during RIIO-ED1, the Flexibility and Capacity Working Group (FCWG) has sought to develop the relevant arrangements to set DNO funding for secondary network reinforcement issues and distributed generation. While a number of different funding arrangements and uncertainty mechanisms were put forward to the FCWG, we feel that a volume driver with appropriate calibration is the most suitable mechanism for mitigating the uncertainty around the uptake of low carbon technologies in setting reinforcement baselines for RIIO-ED1.

5.65. There are two approaches that have been put forward that can be categorised as volume driver mechanisms. As set out below, there are both similarities and differences between the two proposals. The key differential factor relates to the volume unit that is used within the volume driver mechanism. The proposals are to use either the MW of low-carbon technology and DG added to the network, or the number of secondary network interventions required.

Option 1

5.66. Option 1 sets a flexible baseline based on the MW of low carbon devices connected. For each technology type, and at each voltage level, the average incremental cost of installing a MW of low carbon technology would need to be set. It is proposed that these costs are set based on existing DNO capacity level, modelled assumptions on how low carbon devices will cluster on the network and the relative costs of different approaches to accommodating each incremental MW.

5.67. Once these MW unit costs have been set, multiplying them by the DNO forecast of connected MW in RIIO-ED1 would set the initial baseline. During the period, the actual number of low carbon MW installed compared to forecasts would adjust the baseline allowance available to the DNO by the difference in MW multiplied

by the unit cost. The actual cost of delivery compared with the derived unit costs that are set up front would reward efficient DNO delivery and penalise inefficient delivery through the efficiency incentive mechanism. It is proposed that DNO exposure to this penalty or reward is capped and collared, and where this cap or collar is reached; there is the potential for rebasing the unit costs around the actual costs experienced by DNOs in the early part of RIIO-ED1.

5.68. The proposal suggests a de minimis level of low carbon technology uptake would need to be reached before any funding is received. This is to ensure that DNOs only receive funding for where the work on their network has been materially impacted by the connection of low carbon devices.

Option 2

5.69. Option 2 sets a baseline based on the number of load related interventions a DNO is required to make on the secondary network RIIO-ED1. It is proposed that by modelling the current loading of a DNO network down to the secondary network and then overlaying specific assumptions on low carbon technology take up and modelled assumptions on localised clustering, it will be possible to determine a forecast number of secondary network assets and circuits that will require some form of load related intervention in RIIO-ED1. Across a defined list of distinct interventions, unit costs are to be set for intervention types based on a discounted view of traditional solutions to reflect the anticipated impact of smart technology solutions. The forecast volumes of interventions would be multiplied by the unit costs of these interventions to set the initial DNO baseline.

5.70. The proposal suggests a dead band of plus and minus 20 per cent should be set around the initial DNO baseline. The volume driver true up based on actual volumes of interventions is only to be triggered when the actual volume of interventions is 20 per cent above or below the forecast volume.

Table 5.2: Summary of options for General Reinforcement (HV-LV)

	Option 1	**Option 2**
Mechanism funds DNOs for:	MW of low carbon technologies added to network	Interventions on secondary network / 'problems to solve'
Unit of volume in driver:	Adding MW of low carbon technology to the network	Number of interventions / 'problems solved'
Required unit cost assessment:	Unit cost(s) of providing MW of low carbon technologies - £ p/MW	Unit cost of 'solving problems'
Approach to uncertainty:	Cap and collar on the amount of reward/ penalty against the £ p/MW unit cost. Potential reopener or amended £ p/MW	Dead band plus and minus twenty per cent around DNO forecast of problems to solve. Only variation beyond this threshold amends funding
Cost areas included in mechanism:	Incremental costs associated with accommodation of low carbon devices only	All LRE

5.71. In terms of assessment of the two proposals, we feel that the following are key requirements for an effective general reinforcement volume driver for RIIO-ED1:

- encourages DNOs to seek the most efficient long-term solution
- is simple to implement and interacts with the other relevant funding mechanisms in a clear and transparent manner
- the unit within the volume driver mechanism can be clearly measured
- the unit cost of the unit within the volume driver can be set upfront.

Encourages DNOs to seek the most efficient long-term solution

5.72. Both of the proposals set out above are heavily reliant on modelling. While this is not necessarily a problem in terms of forecasting volumes of MW or volumes of interventions, both proposals require the setting of a unit cost for activities that are likely to be difficult to define and will be heavily reliant on modelled assumptions. There are a number of elements of the proposals that require further development before either is considered an appropriate mechanism for setting baseline allowances for secondary network load related investment.

5.73. Setting a unit cost for either the average incremental cost per MW of low carbon technology, or an 'intervention', will require modelling assumptions to be made on the following issues:

- the level of low carbon devices connected in the RIIO-ED1 period and the level of other load types

- the mix of low carbon technology types that will make up the total MW connected in RIIO-ED1
- the location of clustering of low carbon devices on the network
- the mix of solutions that will be undertaken to accommodate the different technologies at the different voltages.

5.74. We would multiply the expected volumes by the unit costs to determine to determine an ex ante baseline.

5.75. For the volume drivers to function mechanistically, the unit cost derived from these assumptions would need to remain constant as the volume of MW or interventions changes. In reality, all of these elements will interact with each other and thus, as these volumes change, it is possible that the underlying assumptions that feed into the unit costs will have changed too.

5.76. If we take demand side response (DSR) as an example, its viability as a potential solution will vary depending on the types of low carbon device connecting, how these cluster and the actual number of MW that connect. If the volume of low carbon devices that actually connect is significantly different from the forecast volumes, then the assumed number of situations in which DSR is an appropriate solution, which feeds into the unit cost calculation, would be potentially incorrect. For this reason, we do have a concern that under both proposals, the unit costs to which the DNO efficiency is compared, are overly reliant on a number of up front modelled assumptions. This could mean that a DNO's financial success or failure against the unit cost elements in both proposals could be more a reflection of the specific upfront assumptions made, rather than actual efficiency levels.

5.77. A potential means of mitigating this concern could be to set out a framework whereby DNOs provide their assumptions on the following elements across a number of common definable low carbon scenarios:

- list of specific interventions that can be utilised to allow for the accommodation of low carbon technologies on the DNO network
- the percentage of cases in which each intervention type is forecast to be undertaken
- the unit cost of each intervention.

5.78. Figure 5.2 below shows how this could work using hypothetical figures for illustrative purposes.

Figure 5.2: Low carbon technology accommodation scenarios – illustrative example

Modelled assumptions:

Low carbon technology type: Device A
Assumed Scenario: "low"

MW Connected: 20000

Assumptions applied to Low scenario:

Intervention:	Percentage of occasions where intervention will be utilised:	Unit cost per MW of Device A	Weighted unit cost - (Unit cost per MW x percentage of occasions where intervention will be utilised):
Upgrade transformer	25%	£150	£37.50
Overlay cable	38%	£100	£38.00
DSR contract	20%	£75	£15.00
Storage	2%	£30	£0.60
voltage monitoring	15%	£10	£1.50

Indicative unit cost per MW of Device A - (sum of weighted unit costs): **£93**

Low carbon technology type: Device A
Assumed Scenario: "medium"
Number Connected: 40000

Assumptions applied to Medium scenario:

Intervention:	Percentage of occasions where intervention will be utilised:	Unit cost per MW of Device A	Weighted unit cost - (Unit cost per MW x percentage of occasions where intervention will be utilised):
Upgrade transformer	35%	£150	£52.50
Overlay cable	38%	£100	£38.00
DSR contract	10%	£75	£7.50
Storage	2%	£30	£0.60
voltage monitoring	15%	£10	£1.50

Indicative unit cost per MW of Device A - (sum of weighted unit costs): **£100**

Initial baseline allowance

Baseline allowance set based on presumed "low" scenario:	20000 x £93 =	£1,852,000

Volume-based adjustment to baseline allowance

If "medium" scenario of 40000 x Device A actually occurs:

Adjust as mechanistic volume driver based on original "low" scenario assumptions:	40000 x £93 =	£3,704,000
OR Adjust unit cost assumptions based on the "medium" scenario that has occurred:	40000 x £100 =	£4,004,000

5.79. Allowing the assumptions that built up the unit cost per MW to flex as the volume scenario changes would allow for a more nuanced and sophisticated approach to reconciling the upfront assumptions built into one scenario with the realities of the scenario that develops. At the same time, however, this could also add additional complexity and uncertainty, particularly if there are too many scenarios included in the work.

5.80. We welcome views on the viability of this approach and where possible will be looking to work with industry to define exactly how this could be done in practice.

5.81. Another approach could be to set a fixed unit cost composed from a mix of intervention costs and apply a discount rate over time based on an assumed long-term efficiency gain that can be derived from a movement to smarter technologies. This could be done through reducing the weighting of the conventional intervention cost into the overall unit cost over time.

Is simple to implement and interacts with the other relevant funding mechanisms in a clear and transparent manner

5.82. Another aspect requiring further work is how the proposals interact with the other areas of cost assessment. It is important to identify potential boundary issues between cost categories that will need to be overcome before finalising our view on the proposals in time for the February Strategy Decision.

5.83. In the case of Option 1, we have concerns over how the volume driver would interact with the relevant connections cost assessment arrangements where a low carbon device is connected as part of a wider connection project. It is not clear whether the overall costs of the connection project would be captured within the connections volume driver, with the costs of connecting the low carbon device being zero for the purposes of the MW volume driver, or whether a specific incremental cost of connecting the low carbon device would need to be identified. Alternatively, these MW could be excluded from the MW driver, which would need to be factored into how any volume driver true up is carried out.

The unit within the volume driver mechanism can be clearly measured

5.84. In the case of Option 2 additional work is required on defining the potential interventions. In addition, there is a need to establish how more than one intervention type on a piece of network would be captured and treated through the funding mechanism. For instance the installation of monitoring equipment on the network could conceivably be considered a smart intervention. If this is the case, further work will be needed to determine appropriate arrangements should this monitoring equipment ultimately determine that reinforcement is required. It would seem inappropriate to allow for funding of two interventions to address one problem. But at the same time, it is important to encourage DNOs to consider a range of techniques rather than always deciding to reinforce.

5.85. Additionally, subject to further work being undertaken on defining the potential intervention types, issues could arise if a number of intervention-specific unit costs are set. We have a concern that this might lead to a DNO to favour a solution where they believe they can out-perform the set unit cost rather than selecting the most appropriate long-term solution for network reliability and timely connection.

The unit cost within the volume driver can be set upfront

5.86. As mentioned above, a number of the elements of Option 2 are not currently defined. Additionally, certain elements of both proposals relating to new approaches and technologies would need to be built from modelled assumptions that are based on limited data from trials carried out as part of the Low Carbon Network (LCN) Fund.

5.87. While there are elements of both proposals that will require further development before the February Strategy Decision, we do not consider these to be insurmountable. We also welcome any alternative volume driver arrangements that might be suggested, including whether it should be split between demand and

generation and/or whether there should be other different categories within the volume drivers. Ofgem are committed to working with industry to develop a suitable funding mechanism that is compatible with the existing and developed LRE building blocks ahead of the strategy decision.

Table 5.3: Summary of assessment of proposals against specified criteria

Criteria	Option 1: £ per MW of low carbon technologies connected	Option 2: £ per network intervention
1. Encourages DNOs to seek the most efficient long-term solution	Conceptually the mechanism should encourage each MW of low carbon technology to be accommodated in as efficient a manner as possible. However, over-reliance on modelled unit costs could lead to specific technologies being more lucrative for DNOs to accommodate than others and upfront assumptions may ultimately determine financial performance against the mechanism.	Conceptually the mechanism should provide DNOs with the flexibility to choose the most efficient intervention type. However, over- reliance on modelled unit costs could lead to DNOs favouring specific interventions where they perform best against the unit costs.
2. Is simple to implement and interacts with the other relevant funding mechanisms in a clear and transparent manner	The mechanism would be fairly straight forward to implement in isolation, but creates potential boundary issues where MW of low carbon technology are connected as part of a connection project.	Additional work would be required to identify all qualifying "interventions" and determining the relevant unit costs. However, interacts smoothly with other load related funding mechanisms.
3. The unit within the volume driver mechanism can be clearly measured	The DNO will require full notification of low carbon technology installed in order to measure the total volume of megawatts connected. These notification processes are largely untested.	The ease of measurement depends on the clarity of the definition of the unit. It is likely that the volume will be hard to measure in a transparent way due to boundary issues arising from the potentially fluid definition of a network intervention.

4. The unit cost within the volume driver can be set upfront	The costs associated with this unit do not lend themselves to being defined ex ante for the whole of RIIO-ED1. The unit costs are difficult to set as the costs of accommodating low carbon devices is uncertain and will likely be driven by assumed mix of forecast interventions and the costs of these intervention types.	The costs associated with this unit do not lend themselves to being defined ex ante for the whole of RIIO-ED1. The unit cost is difficult to set as it depends on the predicted average cost of an intervention and predicted increases in load. There is uncertainty around these.

Fault Level Reinforcement

5.88. Fault Level Reinforcement refers to reinforcement work carried out for the primary objective of alleviating fault level issues associated with switchgear or other equipment. At DPCR5 Fault Level Reinforcement accounted for £150m in allowances, one per cent of total DPCR5 allowances and two per cent of Network Investment allowances.

5.89. Historically, forecasting the level and likely location of fault level issues has been difficult. As a result previous baselines have been set based on known issues at the time of the price control process. This has usually been based around the number of switchboards and substation busbars that have at least one item of switchgear that is experiencing a fault current level that exceeds 95 per cent of its current fault rating.

5.90. As detailed within both this chapter and more specifically in the Driving sustainable networks chapter of the 'Supplementary annex – Outputs, incentives and innovation', there is a significant level of uncertainty around the take up rates of low carbon devices during RIIO-ED1. The nature of many of these devices mean that a sizeable increase in their connection will likely lead to an increase in Fault Level Reinforcement.

5.91. We propose to set initial baselines for Fault Level Reinforcement based on known issues affecting the network at the time the business plan is submitted.

High Value Projects (HVPs)

5.92. HVPs cover specific schemes where the related expenditure passes the high value project threshold as determined by Ofgem. At DPCR5 this threshold was sent at £15m and HVPs accounted for £285m in ex ante allowances, two per cent of total DPCR5 allowances and four per cent of Network Investment allowances.

DPCR5 approach and proposed RIIO-ED1 approach

5.93. Most of the DPCR5 projects related to large general reinforcement schemes, although a limited number were asset replacement projects which also exceeded £15m. We removed the costs of high value schemes in the LPN area from both the Network Investment unit costs analysis and from the regression and other analysis of operational costs. The nature and scale of these schemes meant that they were unlike other schemes undertaken by the other DNOs.

5.94. There was some uncertainty over whether HVPs would go ahead during DPCR5 or whether issues such as planning consents or resourcing constraints would delay them. We were concerned that our proposed output measures would not fully capture whether the projects that had gone ahead, and had to ensure that customers only paid where investment had been made.

5.95. For DPCR5 we decided that HVPs should be subject to the following treatment:

- an ex ante allowance was included in our baselines (subject to an efficiency adjustment where appropriate)
- the DNOs were required to commit to project specific outputs
- if outputs were not delivered an adjustment was made based on the outputs gap[14]
- if the total spend on HVPs was +/- 20 per cent of the total ex ante allowance and all outputs were delivered the HVPs were eligible for the reopener of these projects.

5.96. For RIIO-ED1 we propose to revise our approach to HVPs. Although we propose to retain an ex ante allowance, this would be contingent on DNOs providing sufficient evidence of need, costs and clearly identified outputs at the time the price control is set. In order to assess this need case, we propose to require DNOs to provide specific project details and clear outputs, which would be subjected to cost assessment. With regard to the threshold value for projects to be considered high value, we propose to increase this to £50m.

[14] Outputs gap refers to a valuation of the difference between the level of output or secondary deliverable performance agreed to be delivered and the actual level delivered

5.97. In addition to the HVPs that are funded through the ex ante allowance, we also propose to include specific large schemes above £50m, that are not funded ex ante (as a result of either relating to an issue not identified at the time of delivering the business plan, or where the needs case was not met) are included in the expenditure that could be eligible for the HVP reopener. We would again expect to see clear outputs, forecast costs and a need case presented at the time of their submission for a reopener.

5.98. This approach would effectively move benchmarking of these HVPs outside of the normal price control and create separate outputs for them. If all of the criteria are met we would then adjust the DNO's revenues during the price control period to enable these costs to be recovered.

Transmission Connection Points

5.99. For DPCR5, we introduced a hybrid incentive framework to cover the investment costs relating to the points at which the DNO network connects to the transmission network. The investment and operational cost for this area were previously treated as pass-through and therefore fully recovered from DNO customers. The DPCR5 incentive scheme, which exposed the DNO to 20 per cent of any annual over or under-spend against their allowance for relevant DNO-triggered new work, was designed to encourage optimum efficiency, through allowing DNOs to explore innovative commercial arrangements such as DSR as an alternative to traditional investment.

5.100. We are broadly comfortable with the arrangements of the incentives. However, we consider that setting an ex ante allowance, which takes into consideration the learning from DPCR5 on how non-traditional commercial arrangements can be utilised, would encourage the same behaviour whilst offering the benefit of giving DNOs more certainty and being easier and more transparent during RIIO-ED1.

Options for consultation

- Option 1: continuation of DPCR5 hybrid incentive scheme. Cost areas separated into those that are incentivised and those that are not:
    - Incentivised: New Grid Supply Point (GSP) and GSP reinforcement during RIIO-ED1 as a result of DNO requirement
    - Pass-through: Costs relevant to assets installed before 1 April 2010, GSP refurbishment in RIIO-ED1 and any work not resulting from a DNO requirement
- Option 2: ex ante allowance based on individual review of schemes put forward in DNO business plans and historical costs. This might include benchmarking of associated unit costs where appropriate for any commonly occurring elements and discount factor applied to historical cost trends to account for likely cost benefits of innovative techniques

5.101. Our preference is to follow option 2 as outlined above, but we welcome views on the relative benefits of each approach and on how best to set an ex ante allowance to cover this area of expenditure.

6. Network Investment – Non-Load Related Expenditure

Chapter Summary

This chapter sets out the nature of non-load related expenditure (NLRE) elements of Network Investment and details our proposed approach for assessing the NLRE elements of the DNOs business plans in line with the RIIO framework.

Question 1: Do you agree with our approach for assessing NLRE in the companies' business plans?
Question 2: In light of our proposals, do you agree with our selection of risk removed as the primary output of the mains replacement programme?
Question 3: Do you agree with our approach to remove non-modelled costs in RIIO-ED1?
Question 4: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on Legal and Safety? If not, what changes would you propose?
Question 5: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on ESQCR? If not, what changes would you propose?
Question 6: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on flooding? If not, what changes would you propose?
Question 7: Do you agree with our proposed approach not to fund Quality of Service (QoS) improvements during RIIO-ED1?
Question 8: Do you agree with our proposed approach to change Black Start and Rising and Lateral Mains (RLM) from reopener mechanisms to ex ante allowances?
Question 9: Do you agree with our approach to assessing enhanced physical site security costs?

Introduction

6.1. As noted in the chapter above, Network Investment has been split into two groups – LRE and NLRE. The latter is discussed in this chapter and refers to expenditure relating to the following activities:

- Asset Replacement
- Operational Information Technology and Telecoms (IT&T)
- Legal and Safety
- Electricity Safety Quality and Continuity of Supply Regulations (ESQCR)
- Quality of Supply (QoS)
- non-core ex ante costs including
    - Flood Mitigation
    - BT 21st Century projects
    - High Impact Low Probability (HILP)

- Environmental areas (losses, oil pollution, SF6 leakage, environmental other)
- DPCR5 non-core reopeners including[15]
  - Enhanced physical site security (previously Critical National Infrastructure (CNI))
  - Black Start
  - Rising and Lateral Mains (RLM).

6.2. NLRE covers all capital investment associated with rectifying the likelihood and consequences of asset failure. Collectively these activities comprised £5,063m or 32 per cent of total DPCR5 allowances and 67 per cent of all Network Investment allowances.

Asset Intervention

6.3. Asset Replacement was the largest component of NLRE for the DNOs, equalling £4,127m or 26 per cent of the DNOs' ex ante cost allowances for DPCR5 and 54 per cent of total Network Investment.

DPCR5 approach and proposed RIIO-ED1 approach

6.4. Our approach to assessment of NLRE in DCPR5 was to use an asset age-based model (which was used in DPCR4) to benchmark the DNOs' replacement volumes and expenditures. In addition to this benchmarking, and for areas not amenable to such modelling, we analysed unit costs and expenditure trends, as well as subjected expenditure on specific asset types to expert review. In combination with this assessment, in DCPR5 we introduced output measures in the form of asset Health Indices (HIs) and other secondary deliverables which corresponded to NLRE allowances. Companies were required to provide robust evidence on asset health to justify departures from our replacement volumes based on age-based modelling.

6.5. For RIIO-ED1 we are proposing to adopt a similar approach, with potential improvements to the age-based model as well as introducing regression analysis to consider the efficiency of unit costs and expenditure not covered by age-based modelling.

6.6. We are looking for DNOs to put forward a more comprehensive approach to explain their forecast expenditure associated with the management of assets. This should recognise the trade-off between different types of asset intervention such as asset replacement, heavy or light refurbishment, I&M and replacement on failure (replacement or trouble call expenditure). This should include appropriate use of whole-life costing and CBA. We expect DNOs to link this to their output information including both HIs and LIs as well as primary outputs. The DNOs should articulate and quantify the interactions between LRE and NLRE. Where the DNOs have poorer asset information they should articulate this and explain how they will address this during the review or as part of RIIO-ED1. We will aim to combine our analysis for

[15] Note: For RIIO-ED1 we propose that both Black Start and RLM are no longer reopeners but are ex ante allowances.

asset replacement, I&M and trouble call in RIIO-ED1 to address boundary issues and avoid perverse incentives.

Efficiency assessment

6.7. In previous price control reviews we have used a standard age-based asset survivor model to forecast a volume of asset replacement for each DNO. The model combines assumptions about the probability of asset failure/replacement and the DNOs' asset age profiles to derive an industry benchmark for the life for each asset type and forecast replacement volumes for each DNO. The model's outputs are a point of comparison with the volumes and expenditures contained in the DNOs' business plans and can be more heavily relied on where there are limited data on asset condition (including where future deterioration is difficult to predict). It is important to note for RIIO-ED1 that we see the volumes resulting from the age-based modelling to set out a medium-longer term view of the extent of asset intervention that is needed. It does not set out volumes of asset replacement and the model information needs to be considered together with appropriate output information to determine what intervention is needed. As such we would expect the volumes from the age-based modelling multiplied by the benchmark replacement unit costs to set the outer limit of expenditure related to asset intervention. In practice the DNOs have a much wider range of tools at their disposal and forecast expenditure on asset intervention should be much lower.

6.8. We propose that volumes derived from the model would be combined with our assessment of efficient unit costs for asset replacement to assess an outer limit for asset intervention expenditure. The process we propose to adopt is similar to that used in DPCR5, namely a benchmarking of comparable unit costs for each asset type, with adjustments that recognise known cost differences between the DNOs. As with all benchmarked costs in RIIO-ED1 we propose to set the benchmark at the UQ. We will also use unit costs or regression information for I&M and trouble call expenditure to assess an appropriate benchmark level of expenditure.

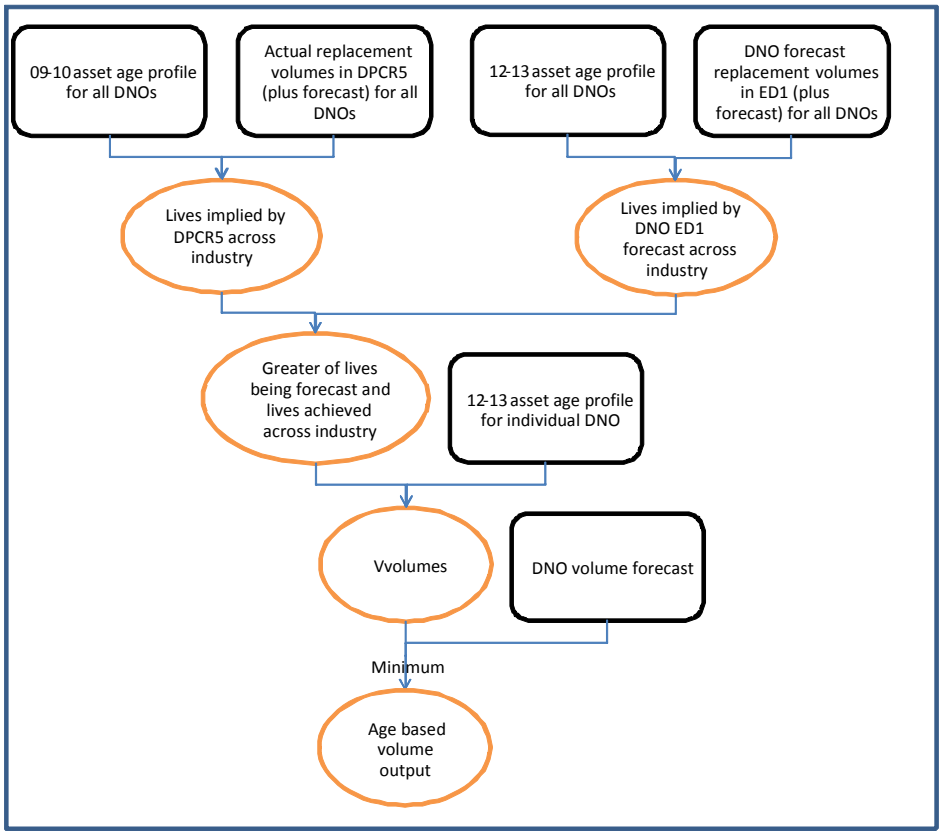
6.9. We envisage that for some elements of NLRE it will not be possible to conduct replacement modelling or unit cost assessment. In DCPR5 we subjected such non-modelled costs to expert review. For RIIO-ED1 we propose to minimise the need for ad hoc reviews by expanding the scope of volume and unit cost benchmarking.

6.10. As set out in the 'Supplementary annex – Reliability and safety', we propose that DNOs will be required to provide a range of outputs that relate to asset intervention expenditure, including a measure based on asset health indices and asset fault rates. As part of our assessment of the DNOs' expenditure forecasts we would consider the quality of their proposed outputs and the data behind these.

6.11. The choice of 2009-10 and 2012-13 as age profile references relate to the commencement of the DCPR5 period and the final year of actual data for the purposes of the RIIO-ED1 assessment respectively.

6.12. The model is designed around the assumption that industry asset lives can either be maintained at the levels achieved in the past or longer lives can be achieved in the future through improved asset management. For this reason, the model calculates the highest of the lives achieved across the industry that are implied by asset replacement volumes in DPCR5 or RIIO-ED1. This benchmark set of asset lives is then combined with each DNO's individual asset age profile to give a DNO modelled volume. This process is illustrated in Figure 6.1. The model refers only to assessing replacement volumes and the results of it must be consider in line with other potential asset intervention.

Figure 6.1: Asset age-based model



6.13. We understand that such modelling has limitations and will not fully take account of all relevant factors. Where such factors result in a material divergence from our modelling outputs, whether they be higher or lower than implied by the model, DNOs should be able to present compelling bottom-up evidence to justify their expenditure needs. Where evidence provided is not considered to be of a high enough standard we will place more weight on the output of the model. The types of

supporting evidence we considered in DCPR5, and that are likely to be considered in RIIO-ED1, for departures from model outputs were:

- business cases and other supporting narratives for named schemes and high value assets
- asset specific condition information
- relationships to health indices
- evidence of poor or worsening performance
- evidence of type faults, failure modes and safety issues
- reports from specialist external consultants.[16]

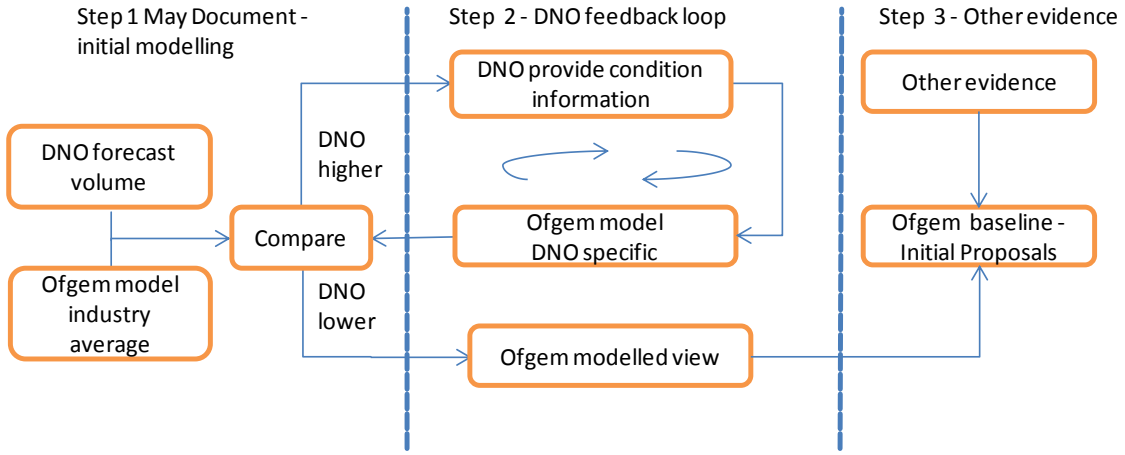
6.14. The proposed role of the replacement model in our overall approach to assessing NLRE is illustrated in Figure 6.2 below. As shown the model outputs form one part of an iterative process along with DNO supporting evidence such as condition information and any further evidence.

6.15. The model used in DPCR5 built on previous models to calculate lives based on historical and forecast volumes of replacements. The model's main feature is the assumed 'Poisson' probability distribution where the standard deviation is the square root of the mean expected asset life.[17] Specifically, the model uses replacement volumes and asset age profiles to calculate the following:

- the lives that when entered into the model using the asset age profile at 2009-10 give output volumes equal to those actually (and expected to be) replaced by the DNOs in DPCR5
- the lives that when entered into the model using the asset age profile at 2012-13 give output volumes equal to those forecast by the DNOs to be replaced in RIIO-ED1.

[16] Electricity Distribution Price Control Review Final Proposals - Allowed revenue - Cost assessment appendix (146a/09), 7 December 2009, p. 17.
[17] 'Poisson' probability distribution is a discrete probability distribution that expresses the probability of a given number of events occurring in a fixed interval of time and/or space if these events occur with a known average rate and independently of the time since the last event.

Figure 6.2: Asset Intervention methodology



6.16. We propose to carry out a separate unit cost assessment which we would use to derive expenditure allowances from our adjusted volumes.

Unit cost assessment

6.17. In DPCR5 we developed benchmark unit costs as the industry median values for each asset type taken from unit cost schedules provided in the Forecast Business Plan Questionnaires (FBPQs). These values were adjusted to reflect known variances including due to scope of works. In limited cases we accepted DNO arguments to not apply the benchmark unit cost eg for works in central London. Some work was also undertaken by the DNOs to properly reconcile unit costs between assets subjected to volume modelling and those assets outside of the model. In setting baseline expenditures we only applied the benchmark where this was below the unit costs proposed by the DNOs. A unit cost adjustment was also made for those DNOs whose forecasts were based on unit costs that were better than the UQ unit cost for the majority of asset categories (on the basis that they would otherwise have potential difficulties in outperforming the benchmark).

6.18. For RIIO-ED1 we propose to continue with a unit cost approach as a basis for expenditure modelling, and will provide DNOs the opportunity to submit justifications for departures from the benchmark. We may also employ technical consultants to assist in this process. This may involve providing comparative cost data as well as reviewing DNO proposals.

Current update of the model

6.19. We have updated the model used in DCPR5 to align with more recent asset data templates and propose to use the data submitted by the DNOs in July 2012 to test the compatibility of the model and identify any issues in its calculations. We have also considered adapting the model used for similar analysis as part of RIIO-T1.

6.20. Initial analysis revealed some anomalies but over the coming months we intend to work with the DNOs to rectify these and produce a preliminary set of

modelled volumes and expenditures. We expect to publish these results prior to or with our Strategy Decision in February 2013. We propose to use the model developed in RIIO-T1 which includes Monte Carlo modelling as this has been developed further than the DPCR5 model and uses the same fundamental analysis.

Non-modelled costs

6.21. In DPCR5, we undertook trend review for the following asset types:

- overhead pole lines
- substation costs
- other non-modelled costs.

6.22. We believe that we have made significant improvements during DPCR5 through the work undertaken in the RIGs and at this stage, subject to consultation, we believe that there is no need to have non-modelled costs in RIIO-ED1.

6.23. We will be circulating the age-based model at the CAWG in the coming months to generate further discussion and refinement. In doing so it is our intention to reinforce the robustness of model outputs for particular asset types and to develop a shared understanding of any data gaps or other weaknesses in the modelling.

Operational IT&T

6.24. Operational IT&T refers to equipment which is used exclusively in the real time management of network assets, but which does not form part of those network assets. In DPCR5, Operational IT&T accounted for £121m or one per cent of the DNOs' cost allowances for DPCR5 and two per cent of total Network Investment.

6.25. Expenditure on Operational IT&T in DPCR5 was subject to expert review which focused on three areas of investment:

- substation Remote Terminal Units (RTUs), marshalling kiosks and receivers
- communications for switching and monitoring
- control centre hardware and software.

6.26. We propose in RIIO-ED1 that Operational IT&T is again subject to expert review. We believe it is appropriate that this expert review also includes a review of the indirect IT&T costs, which would also now include the associated non-operational capital expenditure (this is discussed in further detail in Chapter 8).

Legal and Safety

6.27. Legal and Safety includes any investment or intervention where the prime driver is to meet safety requirements and to protect staff and the public. It does not include assets replaced because of condition assessment or to meet Electricity Safety Quality and Continuity of Supply Regulations (ESQCR) regulations 17 and 18. [18]

6.28. In DPCR5 the allowance for Legal and Safety accounted for £102m or one per cent of total DPCR5 allowances and one per cent of the total Network Investment costs.

6.29. At the beginning of DPCR5, Legal and Safety was intended to include both safety clearance costs associated with ESQCR and expenditure relating to maintaining continuity of supply through vegetation management (also required by the ESQCR). Over the course of DPCR5 these evolved into two separate programmes, ESQCR and tree cutting respectively. The approaches for these are discussed in more detail below.

6.30. For RIIO-ED1 we propose that Legal and Safety expenditure totals will be derived from analysis of the following cost categories, largely consistent with those used at the end of DPCR5:

- site security
- asbestos management
- safety climbing fixtures
- fire protection
- earthing upgrades
- metal theft remedial work
- other legal and safety cost areas as specified by the DNOs.

6.31. Following discussions during the CAWG meetings we feel that while specific proposal reviews might be appropriate for Legal and Safety, we must remain mindful of the time available to make fast-tracking decisions. To undertake such reviews may not be practical. Legal and Safety is an area where the approach may differ for fast-track and non-fast-track assessment.

DPCR5 approach and proposed RIIO-ED1 approach

6.32. Site security was the largest area of Legal and Safety expenditure for DNOs during DPCR5. For DPCR5 Initial Proposals we carried out a benchmarking exercise of site security costs based on the number of EHV and 132kV substations. We set the baseline in line with the outcome of this benchmarking. In response to Initial Proposals, several DNOs questioned the robustness of the benchmarking carried out for site security costs. They considered that increasing, but regionally dependent levels of criminal activity meant that the benchmarking carried out was inappropriate. We took the view that the DNOs were best placed to assess trends in

[18] http://www.legislation.gov.uk/uksi/2002/2665/contents/made.

the level of such activity in their areas and that their forecasts are more robust than the simple benchmarking carried out for initial proposals. We therefore accepted the DNOs' forecasts with no reductions. We propose to revisit this approach and may apply a benchmark unit cost to DNO volume forecasts.

6.33. For the other six areas of Legal and Safety costs we carried out a high level review of the DNOs' forecasts. This involved using run-rate analysis, unit cost analysis, scheme analysis and benchmarking to assess the DNOs forecast plans and to determine whether these were in line with an acceptable level of expenditure. For DPCR5 this resulted in no proposed reductions. Due to the relatively small volumes and levels of expenditure forecast by the DNOs in these areas, we propose a similar high level approach for RIIO-ED1. This is subject to the quality of evidence submitted.

6.34. Metal theft remedial work is a new category of expenditure which we have asked DNOs to report on in the wake of an increase in incidences of theft and the resulting industry wide concern over its detrimental impact. In 2011-12, the first year of reporting metal theft remedial work as a separate line of expenditure, it accounted for a relatively significant proportion of DNOs' Legal and Safety expenditure, however in general this was still much less than that spent on site security and more in line with the other areas. We propose that allowances for metal theft remedial work be treated in the same way to the other areas of Legal and Safety expenditure.

Electricity Safety Quality and Continuity Regulations (ESQCR)

6.35. Expenditure on ESQCR covers those activities required to ensure that a DNO's network remains compliant with these regulations.

DPCR5 approach and proposed RIIO-ED1 approach

6.36. In DPCR5, ESQCR accounted for £321m or two per cent of the DNOs' cost allowances for DPCR5 and four per cent of total Network Investment.

6.37. When assessing ESQCR safety clearance costs for DPCR5 we carried out similar benchmarking to that used in the DPCR4 reopener. The key difference was that for DPCR5 these were benchmarked relative to the mean rather than to the less challenging LQ of performance.

6.38. In DPCR5 we only benchmarked the unit costs of addressing sites with clearance issues as the required volume of works had been subject to detailed survey and agreement with the Health and Safety Executive (HSE). We collected data at a greater level of detail than for DPCR4 (through a supplementary question) to account for the type of work being undertaken. The DNOs were required to disaggregate work by three categories; replacement of a single service (LV), one, two or three spans of overhead line and four or more spans of overhead line. We gathered this information for:

- undergrounding of LV and HV overhead lines with vertical clearance issues
- rebuilding of LV and HV overhead lines with vertical clearance issues
- undergrounding of LV and HV overhead lines with horizontal clearance issues
- reconductoring of LV and HV overhead lines with horizontal clearance issues.

6.39. The bulk of ESQCR expenditure will fall away during RIIO-ED1. As such, ESQCR expenditure should be considered business as usual as it will no longer constitute a separate programme.

6.40. We propose that for RIIO-ED1 DNOs will need to model their efficient costs for maintaining clearances and that no catch-up allowances will be permitted. This is to deter any delay in necessary investment taking place from the years specified in the DNOs' investment plans. It may be necessary for us to develop a complementary output to monitor expenditure on clearance work in time.

Quality of Service (QoS)

6.41. In DPCR5 we did not propose any allowances for QoS. Under the methodology of the Information Quality Incentive (IQI), this resulted in some QoS costs being included in the baselines.

6.42. This approach was adopted in order to encourage improvements in the quality of service provided to customers without the need to incur investment expenditure. It was felt that this removed the need for any up-front funding for investment expenditure to meet the Interruptions Incentive Scheme (IIS) targets. At the time we felt that any decision about expenditure to improve IIS should be based on the incentive rates.

6.43. We are not proposing to provide any ex ante allowances for QoS investment in RIIO-ED1.

Non-core ex ante costs

6.44. Non-core ex ante costs refers to discretionary expenditure where there is a high level of uncertainty. These fall into seven areas:

1. Flood mitigation
2. BT 21st century
3. High Impact Low Probability (HILP)
4. Oil pollution
5. SF6 leakage
6. Environmental other
7. Technical losses

6.45. In DPCR5, non-core ex ante costs accounted for £331m or two per cent of the DNOs' cost allowances for DPCR5 and four per cent of total Network Investment.

Flood Mitigation

6.46. Flooding covers any expenditure relating to work undertaken to reduce flood risks at sites on the DNOs' networks.

DPCR5 approach and proposed RIIO-ED1 approach

6.47. In DPCR5 a risk reduction benchmarking approach was used for flooding. Given the range of sites and factors involved, we used the LQ average cost per risk reduction as the benchmark. Where the DNO's forecast was above this we scaled back their forecast by the percentage they were above the LQ average cost per risk reduced. Where DNOs were below the LQ average cost per risk reduced we gave them their own forecast.

6.48. Our proposals for DPCR5 were derived from analysis of the following three cost categories:

- forecast expenditure on super grid, bulk supply points and primary substation
- forecast expenditure on site surveys
- forecast expenditure for non site specific costs, such as portable flood defences.

6.49. For the first of these categories we carried out analysis of the forecast costs by splitting the forecasts into the three types of substation. Within these groups we then divided the sites into those where a site specific survey was undertaken and those where the forecast costs were based on some form of estimate. We benchmarked the cost per customer for providing flood protection and gave DNOs the minimum of their own forecast and the LQ cost per customer benchmark.

6.50. For both site surveys and non-site specific flood related expenditure we allowed DNOs the minimum of their own forecast and the DPCR4 average expenditure on site surveys (for those DNOs that undertook site surveys in DPCR4).

6.51. Following discussions during the CAWG meetings, and given the level of work that has taken place in the surveying and planning phase to date, we feel that a different approach to benchmarking should be taken for RIIO-ED1. We propose to therefore use UQ benchmarking if possible and if not the industry average. We also propose not to include site survey expenditure within the allowance as these surveys should have been completed before the commencement of RIIO-ED1.

6.52. We believe that a whole life costs approach is appropriate in assessing flood protection because DNOs may adopt either an opex solution or a capex solution to flood risk. For example, some DNOs will be inclined to protect perceived weak points in their networks or sites, using temporary or portable flood protection measures, ie an opex approach. Other DNOs will attempt to mitigate risks at an entire site by upgrading the permanent flood protection present, ie a capex approach.

6.53. As set out in the 'Supplementary annex – Reliability and safety', for RIIO-ED1 we propose to make more explicit reference to the risk deltas to be delivered by each DNO to measure their performance against forecasts.

BT 21st century (BT21CN)

6.54. BT21CN refers to the roll out of BT's next generation communications network which replaces Public Switched Telephone Network (PSTN) with a digital Internet Protocol (IP). Whilst effectively changing the communications protocol used on the existing network assets, it also accelerates the replacement of copper communications circuits with non-metallic optical fibre. The BT21CN activities assessed in DPCR5 were:

- protection communication circuits – replacement
- protection operational measures.

6.55. At DPCR5 DNOs provided an updated high level forecast of expenditure for BT21CN after BT provided further information on their own plans for BT21CN. The forecasts were used to form ex ante allowances. This process was informed by a review of more detailed scheme-by-scheme information. We feel that this situation remains the same and are proposing to provide ex ante allowances for RIIO-ED1. BT indicated ahead of DPCR5 that the leased line services currently used by the DNOs will continue to be provided until 2018, whilst economically viable.

High Impact Low Probability (HILP)

6.56. Electricity distribution networks are designed and built to ensure supply continuity for most customers during planned outages and faults that are considered to be credible events. There is a small risk that a more extreme event occurs that has a very high impact on the ability of the distribution system to provide supply continuity. Such an event could result in extended periods of supply interruption for a significant number of customers and is referred to as HILP.

6.57. HILP activity relates to increasing the security of supply to localities that have a high gross value added, to levels that exceed those recommended in Engineering Recommendation P2/6[19].

6.58. During DPCR5, one DNO forecast a much larger amount of expenditure than all the other DNOs combined. We were however unable to resolve some key concerns about this specific forecast expenditure. These related to gaps in risk assessment completed by the DNO, difficulties in conducting a cost benefit analysis of this investment and the implied cross-subsidy between customer groups that would arise were we to allow the DNO to recover these costs through general DUoS charges. We therefore concluded that the case for this expenditure was not made and that it should not be included in the DPCR5 baseline.

6.59. Our position on this forecast did not preclude DNOs from investing in HILP schemes during DPCR5 where it was efficient. DNOs have to meet their licence obligations for all customers and these obligations provide for the possibility of

[19] More information about Engineering Recommendation P2/6 is available in the Distribution Code: http://www.energynetworks.info/storage/dcode/dcode-pdfs/Distributionper cent20Codeper cent20vper cent2018r1.pdf

building security above recommended normal levels, subject to the risk/reward case being made.

6.60. During DPCR5 a DNO had to take the risk of such expenditure being included in the Regulatory Asset Value (RAV) at the next price control. For HILP investments to be included in the RAV they had to pass the 'economic and efficient' test and we expected to see a substantial contribution from those customers benefiting from the investment. When considering forecast expenditure on HILP, we were also mindful as to whether the expenditure put forward would be more correctly classified as General Reinforcement rather than HILP investment.

6.61. We maintained an option for the government to provide guidance to us on the issue of HILP. If such guidance or direction had been provided, we would have worked with the government and the DNOs to ensure that any investment was made efficiently, taking account of the options available and the benefits delivered.

6.62. For RIIO-ED1, we propose to take a largely similar approach to DPCR5. Given that not all DNOs forecast expenditure on HILP for DPCR5 and that those who did forecast relatively small amounts, we propose to continue to look at forecasts on an individual DNO basis. Any forecast expenditure on HILP will need to be well justified and supported by a robust cost benefit analysis.

Losses, oil pollution, SF6 leakage, environmental other[20]

6.63. For all of the above, we propose that the DNOs put forward a case for each of these using CBA, following the requirements for CBA set out in the 'Supplementary annex – Business plans and proportionate treatment'. We would the review each CBA (including appropriate benchmarking of input assumptions) as part of our work in assessing the appropriate ex ante cost baselines. For any new areas we would consider whether this approach is appropriate or whether we would adopt other methods in our toolkit. Further detail on our proposals in these areas can be found in the 'Supplementary annex - Outputs, incentives and innovation'.

DPCR5 non-core reopener costs

6.64. In DPCR5 non-core reopener costs refers collectively to three areas[21]:

1. Enhanced physical site security (previously CNI)
2. Black Start[22]
3. Rising and Lateral Mains (RLM).

6.65. In DPCR5, there were £30m of ex ante allowances allocated to non-core reopener. This accounted for 0.2 per cent of the DNOs' cost allowances for DPCR5 and 0.4 per cent of total Network Investment allowances.

6.66. As discussed below, for RIIO-ED1 we propose that only enhanced physical site security retains the reopener mechanism. Given the data we now have available from DPCR5 we believe it is appropriate that both Black Start and RLM are subject to ex ante allowances.

Enhanced physical site security

6.67. Enhanced physical site security refers to security enhancements at particular sites.

6.68. Following its review of enhanced physical site security in the energy sector, the Department of Energy and Climate Change (DECC) identified a number of key sites on the DNO networks that would benefit from increased levels of physical security.

6.69. Ofgem's role in relation to these sites is to ensure that the DNOs are properly funded for the costs of delivering any required security enhancements. We propose that for RIIO-ED1 we will set an ex ante allowance for those projects where the DNO is able to provide sufficient detail on the expected works and associated costs.

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[20] Includes fluid-filled cables, noise and environmental other
[21] We understand that in DPCR5 there are reopener mechanisms for HVPs and load related costs but these are covered in earlier sections of this document.
[22] This is referred to as the Specific Security Expenditure Items reopener under CRC 18 of the licence.

6.70. For those projects where the appropriate level of detail is not available at the time when RIIO-ED1 revenue allowances are set, we proposing a reopener mechanism as set out in the 'Supplementary annex - Uncertainty mechanisms' document.

Black Start

6.71. Black Start is the term used in the electricity industry to describe the actions necessary to restore electricity supplies to customers following a total or widespread shutdown of the GB transmission system. Black Start requires distribution substations to be re-energised and reconnected to each other in a controlled way to re-establish a fully interconnected system. The government has identified the improvement of industry capabilities in this area as a key priority.

6.72. Industry parties have been working together via the Energy Networks Association (ENA) to establish a technical standard for enabling the operation of distribution substations for extended periods during a Black Start situation. The main ways in which this will be achieved is through the installation of larger capacity batteries at substations in order to power protection equipment and to allow switching to take place or by introducing schemes to reduce the standing load on existing batteries. Unlike the process used for DPCR5, our strong preference would be to ensure that this work is funded via an ex ante allowance, rather than requiring the DNOs to log up expenditure or including specific reopener provisions in the DNO licenses. The technical standard should allow us to achieve this.

6.73. Once it has been agreed, with appropriate input from industry, government and Ofgem, we expect that companies will use the technical standard in preparing business plan submissions for the RIIO-ED1 period. We propose to use this information to determine the efficient cost of delivering the required changes and companies' allowances for this area will be based on this analysis.

Rising and Lateral Mains (RLM)

6.74. RLM relates to any expenditure on individual DNO owned three phase cable or busbar, not laid in the ground, which runs within or attached to the outside of a multiple occupancy building. For details of the further conditions of what qualifies as RLM, please see the RIGs glossary.[23]

6.75. For DPCR5 the ex ante baseline allowance for RLM was £30m.

6.76. Some DNOs forecast costs for the inspection and replacement of RLM in large scale housing estates. The extent of issues with RLM varied widely across the

[23] http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR5/Documents1/DPCR5_Glossary_Master1.pdf

licensed areas, as did the extent to which ownership had been established. Ownership was relevant because if the RLM was owned by the housing estate then the estate and not the generality of customers needed to cover the cost of inspection and replacement.

6.77. In light of these issues and uncertainties in DPCR5 we included an ex ante allowance to provide interim funding for these costs, after which allowances would be reassessed through a reopener. This also gave those DNOs that did not forecast costs the opportunity to research potential issues.

6.78. We allowed two years for the interim funding, during which time the DNOs were obliged to endeavour to resolve ownership issues. As part of the reopener and at the price control review we sought evidence from the DNOs that they had established ownership and sought to recover the costs from customers where appropriate and we provided some ex ante funding for the first two years. Where the costs had been recovered directly from customers or where DNOs had not used all reasonable endeavours to establish ownership, we reserved the right to claw back some (or all) of these allowances.

6.79. For RIIO-ED1 we believe that DNOs have had sufficient time to resolve any ownership issues. We therefore propose to remove the reopener element and expect DNOs to forecast on an ex ante basis only. We anticipate setting allowances based on the approach used for reviewing the DPCR5 reopener applications.

7. Network Operating Costs

Chapter Summary

This chapter sets out our approach to Network Operating Costs (NOCs) which is the expenditure required to maintain and operate the distribution networks. It will cover our approach to Trouble Call, Severe Weather 1 in 20 Events, Inspection and Maintenance, Tree Cutting and NOCs Other.

Question 1: Do you think that our proposals for the Trouble Call are proportional given the materiality of the area and do you have any preference between the options? Please separate your response by the following categories: low and high voltage overhead faults; low and high voltage underground faults; EHV and 132kV faults; ONIs (formerly non-QoS faults); third party cable damage recovery; pressure assisted cables; and submarine cables.
Question 2: Do you agree with our approach to assessing Severe Weather 1 in 20 Events and do you have any preference between the options?
Question 3: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on Inspection and Maintenance (I&M)? If not, what changes would you propose?
Question 4: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on Tree Cutting? If not, what changes would you propose?
Question 5: Do you agree with our approach to assessing NOCs Other and do you have any preference between the options? Please separate your response by the following categories: dismantlement, remote location generation, and substation electricity.

Introduction

7.1. Network Operating Costs (NOCs) are the costs incurred by DNOs as part of the work required to maintain and operate the distribution networks, such as tree cutting or inspecting assets. These activities accounted for £2,991m or 19 per cent of the cost baselines for DPCR5.

7.2. The activities are reported under NOCs are:

- Trouble Call (£1,439m or nine per cent of DPCR5 allowances)
- Severe Weather 1 in 20 Events (£161m or one per cent)
- Inspections and Maintenance (I&M) (£606m or four per cent)
- Tree Cutting (£608m or four per cent)
- NOCs Other (£178m or one per cent).

Trouble Call

7.3. Trouble Call is the term applied to the activity for the resolution of faults which are interruptions and occurrences not incentivised (ONIs) (these were formerly non-QoS occurrences). Interruptions cause customers to be without supply, whereas generally ONIs do not cause customers to be without off supply, but both may require a response from the DNO to rectify them.

DPCR5 approach and proposed RIIO-ED1 approach

7.4. In DPCR5, the allowances for Trouble Call were £1,439m which accounted for approximately nine per cent of total cost allowances for the industry over the current price control, and 48 per cent of the total industry allowance for NOCs.

7.5. Trouble Call expenditure includes the costs of:

- site visits
- network operations
- issuing safety documentation
- identification of the precise location of a failed asset
- physical repairs to assets (which includes third party damage)
- establishing temporary supply arrangements
- for incidents which affect assets it includes the initial repair and minimum work required to restore faulted equipment back to pre-fault availability and, if applicable, the restoration of supply.

7.6. In DPCR5, Trouble Call was measured across a range of restoration types - unplanned incidents non-damage, unplanned incidents damage, no unplanned incident, and other[24]. Further details on the reporting in this area can be found in the relevant section of the RIGs glossary[25].

7.7. Seven separate categories were assessed, some with a different approach to the cost assessment of Trouble Call. The seven categories were:

1. LV and HV overhead faults
2. LV and HV underground faults
3. EHV and 132kV faults
4. ONIs (formerly non-QoS faults)
5. Third party cable damage recovery
6. Pressure assisted cables
7. Submarine cables.

[24] Other is part of non-quality of service reporting in this area, it includes: abortive visits; meters; responding to critical safety calls; and pilot wire failures.

[25] http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR5/Documents1/DPCR5_Glossary_Master1.pdf

7.8. For LV and HV overhead faults and LV and HV underground faults, the approach taken was to use econometric modelling based on a range of models. Benchmarking analysis was then used to determine the efficient cost for activities in these categories.

7.9. We are considering a number of options for benchmarking purposes depending on the quality of the data. For LV and HV overhead faults and LV and HV underground faults, the first option is to re-use the DPCR5 approach but potentially at the most detailed levels using the new RIGs (for example splitting the data by voltage and by overhead, underground, switching or plant and equipment). The benchmark will be set at the UQ. The second is to use historical volume and unit cost data to set a unit cost benchmark and apply this to the DNOs' forecast volume. A third option to determine efficient costs and also tie volumes to either agreed secondary deliverables or IIS fault rate benchmarking.

7.10. For EHV and 132kV faults, ONIs (formerly non-QoS service faults), and third party cable damage faults the DPCR5 approach was to apply the minimum of the each DNO's own forecast costs and each DNO's average of actual reported costs from 2005-06 to 2008-09 with a one per cent efficiency glide path for the DPCR5 period.

7.11. For EHV and 132kV faults, we are considering a number of options for RIIO-ED1. The first is to continue as per DPCR5 but at the most detailed level now available and investigate splitting it along overhead, underground plant and equipment, and also setting the benchmark at the UQ. The second is to use the ten year average fault rate calculated as part of the IIS target setting mechanism (see 'Supplementary annex - Outputs, incentives and innovation') and then apply average cost per fault to this. A third option is to use historical volume and unit cost data to set a benchmark unit cost and apply this to the DNO's forecast volume.

7.12. For ONIs (formerly non-QoS faults), during the CAWG meetings concerns about reporting in this area were raised by both Ofgem and the DNOs. We have worked during the past year to improve reporting in this area. We propose a number of potential approaches. The first option could be to re-use the DPCR5 approach but tweak it slightly to benchmark at the UQ spend. Another option could be to use benchmarking like the LV and HV fault assessment.

7.13. For third party cable damage recovery we propose to use the maximum of forecasts and historical average. We need to be mindful of any interaction of cost recovery in this area with other fault rate data assessments.

7.14. For pressure assisted cables, the approach was to pro rate a proportion of the cost between faults and Inspection and Maintenance against the combined cost for these assets. A minimum was then taken of each DNO's own forecast costs and each DNO's average of actual reported costs from 2005-06 to 2008-09 with a one per cent efficiency glide path for the DPCR5 period.

7.15. We are considering two options. The first is to conduct an update to the data used in setting allowances in DPCR5. The second is to combine this with our main

fault rate assessment. Due to the volatility in volumes and costs of this data we will need to be careful if combining into the LV and HV fault assessment.

7.16. In DPCR5, the allowance for submarine cable faults accounted for less than one per cent of total cost allowances for the industry over the current price control and less than one per cent of the total industry allowance for NOCs. For submarine cable faults, as only a few of the DNOs have submarine cables, and the costs are high and infrequent, the approach was to set cost baselines at the minimum of the average annual forecast for DPCR5 and the annual actual costs reported for the period 2005-06 to 2008-09. We took a proportionate approach and did not apply an efficiency or growth factor to these cost baselines.

7.17. We propose to use the same approach as was adopted for DPCR5. We believe this is a proportionate response as these account for only 616km of cables (spread across seven DNOs) from a GB total underground cable length of approximately 509,000km. As discussed in Chapter 6 on NLRE we will be combining our analysis for trouble call with the work on asset replacement and I&M.

Severe Weather 1 in 20 Events

7.18. For Severe Weather 1 in 20 Events, the allowances provided under the DPCR4 approach was re-used for DPCR5 and updated for inflation between 2002-03 and 2007-08. The allowance for DPCR5 was £161m, which was one per cent of total DPCR5 allowances and five per cent of total NOCs. We propose to re-use the DPCR5 approach.

Inspections and Maintenance (I&M)

7.19. I&M covers any costs incurred relating to the visual checking of the external condition of system assets, any repairs and maintenance work resulting from these inspections or otherwise.

7.20. In DPCR5, the allowances for I&M was £606m which accounted for approximately four per cent of total cost allowances for the industry over the current price control and 20 per cent of the total industry allowance for NOCs.

7.21. For DPCR5, three separate asset categories were assessed - pressure assisted cables, submarine cables and urban specific. For all three the same approach was undertaken. This involved taking the minimum value of each DNO's own forecast costs and each DNO's average of actual reported costs from 2005-06 to 2008-09 with a one per cent efficiency glide path applied for the DPCR5 period.

7.22. For RIIO-ED1, we propose to refine the DPCR5 approach. For volumes, we propose to take the minimum of each DNO's own forecast costs and the industry average of actual historical volumes with a one per cent efficiency glide path applied for the DPCR5 period. For costs, we propose to benchmark at the UQ unit cost.

7.23. We are interested in views on whether it is possible to refine the methodology used in DPCR5. This may include a different approach to assessing submarine cables.

The relevance of keeping a separate urban specific category of assets is being reviewed and we also intend to review the frequencies proposed for I&M work by the DNOs to ensure that these are appropriate.

Tree Cutting

7.24. Tree Cutting expenditure covers all costs relating to the physical felling or trimming of vegetation around network assets. This includes any tree cutting as part of a capital scheme or undertaken to meet ESQCR requirements. It also includes any costs related to the inspection of vegetation, either to ensure tree cutting has been adequately carried out or to determine where tree cutting will be necessary.

DPCR5 approach and proposed RIIO-ED1 approach

7.25. In DPCR5, the allowances for Tree Cutting was £608m which accounted for approximately four per cent of total cost allowances for the industry over the current price control and 20 per cent of the total industry allowance for NOCs.

7.26. As with other areas of expenditure an econometric modelling approach was taken for our cost assessment and this was based on a range on models.

7.27. Tree Cutting was measured in terms of network spans cut, inspected and managed, with the latter measure being the total of spans cut and inspected.

7.28. Following discussions during the CAWG meetings, the prevailing view was that the same or similar approach used in DPCR5 should be continued. Some slight changes to the approach were put forward.

7.29. For RIIO-ED1 we propose to base our allowances on the DNOs' forecast number of spans managed and cut. As DNOs may decide to change the ratio of spans managed and cut after the allowance has been set, we also propose to include a true up mechanism which will adjust the level of allowance should the ratio change. This will contain a built in tolerance level to allow more efficient Tree Cutting programmes to be implemented by the DNOs when available.

NOCs Other

7.30. NOCs Other, is the term applied to three activities - dismantlement, remote location generation and substation electricity.

7.31. Dismantlement is the activity of de-energising, disconnecting and removing (where appropriate) network assets, where the cost of dismantlement is not chargeable to a third party and no new assets are to be installed.

7.32. Remote location generation relates to fixed diesel generation stations that provide permanent emergency backup in remote locations including islands. Remote locations will generally only have a single electrical feed.

7.33. Substation electricity is the electricity consumed in each DNO's substations. DNOs must register their substation electricity usage (whether metered or unmetered) with a supplier.

DPCR5 approach and proposed RIIO-ED1 approach

7.34. In DPCR5, the allowances for NOCs Other was £178m which accounted for approximately one per cent of total cost allowances for the industry over the current price control, and approximately six per cent of the total industry allowance for NOCs.

7.35. For DPCR5, the allowance for dismantlement was £38m. For most of the DNOs this was set at the minimum of the forecast or the average of the actuals (with a one per cent annual efficiency saving). Electricity North West Limited (ENWL) and SSE Southern Electric Power Distribution (SSES) outlined specific work plans in this area at that time so these were considered separately. For dismantlement in RIIO-ED1, we intend to re-use the DPCR5 approach.

7.36. For DPCR5 the allowance for remote location generation was £26m, which was set by taking the lower of the forecast and average actual costs reported for the period 2005-06 to 2009-10 (with a one per cent annual saving applied). This only applied to a few DNOs with such activities. Again, we are considering re-using the DPCR5 approach.

7.37. For DPCR5, the allowance for substation electricity was £109m. This was set by benchmarking the unit cost of electricity, using the lowest cost forecast, then applying this benchmark to the unit costs of each DNO's forecast units.

7.38. We propose to use a different approach to DPCR5 and benchmark the average usage per site, and multiply by the UQ pence per unit consumed. Factors which may need to be considered with this approach include, the size of the substation, and whether the company is vertically integrated or not. We feel this approach is warranted as we now have more robust data.

8. Closely Associated Indirect Costs

Chapter Summary

This chapter sets out our approach to assessing Closely Associated Indirect costs (CAIs). These are costs that are required to support a DNO's operational activities.

Question 1: Do you agree with our proposed approach to assess CAIs? In particular, do you agree with our groupings of activities?
Question 2: Are there any views as to which cost drivers would be most appropriate?
Question 3: Do you believe our approach to assessing Workforce Renewal is appropriate? In particular, do you believe it is appropriate to consider Workforce Renewal allowances both in isolation and also as part of wider training and do you believe Workforce Renewal should include or exclude the training of contractors?

Introduction

8.1. Indirect operating costs can be split into two categories. Those costs that support the operational activities of the DNO (Closely Associated Indirect costs (CAIs)) and those costs required to support the overall business (Business Support Costs (BSCs)). This chapter discusses CAIs and the next BSCs.

8.2. In DPCR5 CAIs accounted for £2,848m of DPCR5 which is 18 per cent of the total ex ante allowances so it is a significant area.

DPCR5 approach and proposed RIIO-ED1 approach

8.3. For DPCR5 CAIs were split into 11 categories and two groups as set out in Table 8.1.

Table 8.1 DPCR5 and Proposed RIIO-ED1 CAIs

Category	Area in DPCR5	DPCR5 Group	Area in RIIO-ED1	RIIO-ED1 Group
Network Design and Engineering	CAIs	1	CAIs	A
Project Management	CAIs	1	CAIs	A
Engineering Management and Clerical Support (including Wayleaves)	CAIs	1	CAIs	B
System Mapping - Cartographical	CAIs	2	CAIs	A
Control Centre	CAIs	2	CAIs	B
Call Centre	CAIs	2	CAIs	B
Stores	CAIs	2	CAIs	B
Operational Training	CAIs	2	CAIs	B
Vehicles and Transport	CAIs	2	CAIs[26]	A
Small Tools, Equipment, Plant and Machinery	Non-op Capex	NA	CAIs	A
Network Policy	BSCs	NA	CAIs	B
Workforce Renewal	CAIs	NA	CAIs	NA
Traffic Management Act (TMA)	CAIs	NA	CAIs	NA

8.4. In DPCR5, the assessment of Group 1 was driven by total Network Investment in the first instance and MEAV in the second instance. The assessment of Group 2 (excluding transport) was driven by total direct costs in the first instance and MEAV thereafter.

8.5. A criticism of the DPCR5 cost assessment of CAIs was that it was inappropriate to use direct spend as a cost driver as it potentially rewarded inefficient companies and also penalised companies who invest in design and project management costs in order to minimise or avoid direct costs. Taking into consideration the feedback from the DNOs, we propose new arrangements for cost assessment of CAIs in RIIO-ED1.

8.6. Two other areas of CAIs noted in the above table - Workforce Renewal and Traffic Management Act (TMA) - were considered separately from the groups in DPCR5 and will be considered separately in RIIO-ED1.

8.7. Discussions with the DNOs have shaped our thinking on how CAIs should be assessed in RIIO-ED1. These will continue at the CAWG meetings ahead of the February Strategy Decision document. In our initial thinking, we are proposing two notable changes from the DPCR5 approach.

8.8. First, as detailed in Table 8.1, we propose to add two categories to the CAI activities (Small Tools, Equipment, Plant and Machinery and Network Policy), include the Non-Operational Capex element of Vehicles and change the groupings in RIIO-ED1.

[26] This includes the Non-Operational Capex element of Vehicles.

8.9. Small Tools and Equipment, and Plant and Machinery were previously two separate categories in Non-Operational Capex and collectively accounted for £96m of DPCR5 allowances. Network Policy was previously in BSCs and accounted for £52m of DPCR5 allowances and the Non-Operational Capex element of Vehicles accounted for £131m in DPCR5 allowances.

8.10. Our view is that the level of Non-Operational Capex that a DNO spends on vehicles is dependent on the DNOs decision on whether to rent or own assets. At the CAWG meetings, five of the six DNOs agreed that Non-Operational Capex should be considered with their complementary indirect activity. Therefore we propose that Non-Operational Capex Vehicles and the Vehicles and Transport indirect activity will be considered simultaneously. This is to address the differences associated with the purchase and leasing of vehicles. It should also ensure that the analysis will be relatively immune to differences in DNO operating strategies

8.11. We are mindful of the fact that the profile of Non-Operational Capex Vehicles expenditure is irregular and lumpy whereas lease charges tend to be reported year on year. To account for this, we propose to smooth Non-Operational Capex vehicle expenditure using an average annual value.

8.12. In DPCR5 there were issues with the RAV boundary associated with the total cost of providing, operating and managing DNOs' commercial fleets. The cost of leasing vehicles is subject to 85 per cent allocation to RAV, whereas the cost of purchasing vehicles is not added to the RAV. We intend to resolve this differential treatment in RIIO-ED1 (as set out in the Efficiency incentives and IQI chapter of the 'Supplementary annex – Outputs, incentives and innovation'). We propose that both sets of costs receive the same treatment.

8.13. We also propose to move Small Tools and Equipment and Plant and Machinery from Non-Operational Capex to CAIs. We believe that the cost of this equipment is essential to bring assets into service and remain operational and is therefore closely aligned to direct activity. We must be mindful that Small Tools and Equipment and Plant and Machinery expenditure is irregular and lumpy. We propose to smooth this expenditure using an average annual value.

8.14. The second proposed change concerns the grouping of the CAIs activities. At the CAWG meetings DNOs had differing opinions about activity should fall into which group. Our proposed groupings for RIIO-ED1 are set out in Table 8.1.

8.15. Group A contains activities that exist almost entirely to support the delivery of direct activities. One would expect to see a flex in expenditure in these activities with the volume of work being completed by the DNO. An appropriate cost driver would be a reflection of the effectiveness of direct activities undertaken. We welcome views on what would be an appropriate cost driver or composite cost driver.

8.16. The activities in Group B contain substantially fixed costs and would therefore incur costs regardless of the size of the DNO's investment programme. An appropriate method would be to assess the level of expenditure relative to the scale

of the DNO. Discussions on appropriateness of cost drivers will continue at the cost assessment working groups ahead of the February paper.

8.17. The favoured approach discussed to assess CAIs is to use a cost driver which is as closely aligned to the activity as possible. To do this we propose to look at each activity of expenditure separately disaggregating all areas of expenditure. As an example, this may mean assessing outage planning and management (an activity within control centre) simultaneously with system mapping as they both share the same cost driver total network length.

8.18. In DPCR5, Wayleaves, Workforce Renewal and TMA were removed from the DPCR5 benchmarking of CAIs at final proposals. We propose that Workforce Renewal and TMA are again removed from benchmarking in ED1. Wayleaves will remain in engineering management and clerical support but we welcome views on this.

8.19. Our proposed approach to Workforce Renewal and TMA is detailed below.

Workforce Renewal

8.20. Workforce Renewal refers to costs incurred by DNOs to recruit and train apprentices. This recognised the need to recruit to replace an ageing workforce. We understand that there will be a continuing need to recruit and train apprentices within RIIO-ED1 especially. This is not only to replace the existing workforce but also to meet the challenges presented in a smart-grid, low carbon world.

8.21. In DPCR5 £214m or one per cent of total allowances was given for Workforce Renewal. The allowances were awarded on a 'use it or lose it' basis.

8.22. For RIIO-GD1 we developed a methodology for assessing the GDNs' requirements for apprentices and training. We propose to use a similar methodology for RIIO-ED1. As such, rather than a 'use it or lose it' allowance as in DPCR5, we suggest an ex ante allowance for RIIO-ED1.

8.23. We expect licensees to explain and justify the numbers to be recruited and associated costs within their business plan.

8.24. In recent months we have been discussing assessment methodologies with the DNOs in the regular CAWG meetings. The results from these meetings and additional views from DNOs and other stakeholders will help shape the final assessment methodology for apprentice and training costs.

Proposed RIIO-ED1 approach

8.25. We propose that the assessment will use historical trend analysis, forecast trend analysis and matching workforce retirements to apprentices recruited. A mixture of these techniques would be used in the fast-track and the non fast-track assessments. We propose also to review the information provided by the Energy and Utility Skills (EU Skills) who have been working with DNOs in the development of their workforce planning models.

8.26. For the fast-track analysis we propose to compare the total levels of apprentice recruitment in RIIO-ED1 against number of employees retiring. The onus would be on the DNOs to demonstrate that their recruitment plans and costs are efficient and justified both in terms of historical and forecast costs. The review will look at information and evidence provided in the business plans to support their projections of future costs. We propose also to consider historical levels of apprentice recruitment.

8.27. For non fast-tracked companies we propose that apprentice and training costs would be reviewed in more detail. This would entail looking at the historical and forecast costs as in the fast-track process, but at more disaggregated levels than in the initial sweep.

8.28. As DNOs were given specific allowances in DPCR5 for the recruitment of apprentices, we propose to look at the levels of actual recruitment. If DNOs have or plan to under recruit in DPCR5 we propose to take account of this in setting allowances for RIIO-ED1.

8.29. We propose to set a unit cost to be applied to all trainee and apprentice programmes (craftsperson apprentices, engineer apprentices, and graduate and other staff/management trainees). We also propose to set a small amount per DNO per year to cover additional training costs over and above apprentice training costs.

Reporting Workforce Renewal costs

8.30. Unlike DPCR5, we propose that we will not look at Workforce Renewal costs in isolation. Rather, these costs would be considered as part of the wider training costs – both operational and non–operational training costs.

8.31. A key area of debate at the CAWG meetings was whether Workforce Renewal should cover contractor costs. Some DNOs supported allowances to train contractors and others were against this. At this stage, we believe that contractor costs should be excluded from Workforce Renewal. The training costs of contractors should be reflected in the costs DNOs pay for those contractors. We welcome views on this.

Traffic Management Act

8.32. In DPCR5 we set cost baselines for TMA costs excluding any permitting costs (assessed as part of a reopener) and excluding admin costs (included within indirect expenditure). We used the following methods to set allowances for these costs:

- The volumes forecast by the DNOs for the number of notifications and inspections.
- Separate analysis was undertaken for notification and inspection penalties, (detailed in the DPCR5 cost assessment document).
- Only allowed costs that were not expected to be recharged to contractors, for example a DNO that recharges all inspection penalties to contractors does not receive an allowance for these costs. This was to ensure that costs are not double counted within our assessment – contractors' costs already include any expected penalties that will be recharged.

8.33. For other costs (one-off set up costs, lane rentals, overstay fines, and congestion charge payments) in DPCR5 we allowed the DNOs' forecasts.

8.34. For RIIO-ED1 we propose taking a largely similar approach to that used in DPCR5.

Interactions with non-distribution activity and connections

8.35. We also propose that all CAIs are assessed both before and after reallocation to non-distribution activities and connections. This will allow us to test the efficiency of costs that will be funded by DUoS customers. It will also show the extent to which different allocation methodologies may be distorting calculated efficiency. There will be elements of CAIs that will be used in excluded services. It is important that we review allocation methodologies of all DNOs as their allocation methodology should not define the efficiency of a DNO. An inefficient DNO could look efficient in our benchmarking by allocating a lot of expenditure to excluded services. For this reason we expect DNOs to provide their cross subsidy reports and allocation methodologies in support of their business plans.

8.36. Within this process, consideration would need to be given to the DNO indirect cost allocation methodologies and the way in which the impact of part-funded connection work completed by ICPs will affect CAIs forecasts. As mentioned in Chapter 5, we propose to allow ICPs to use DNO price control funding to carry our reinforcement work that would otherwise have been done by the DNO. We propose that this transfer of funding will cover some or all of the indirect costs associated with this work.

8.37. Significant ICP penetration into carrying out reinforcement is likely to impact on the categories of CAIs in different ways. Intuitively, one would expect project management allocations to connections to reduce as increasingly connections project management will not be carried out by the DNO. Presuming that the gross cost base for project management remains constant, this would increase a DNO's net position for project management. If the overall gross cost of project management were to change due to other drivers within the business, the variance between the DNO's net

and gross positions could increase or decrease in line with the gross cost level. In addition, there may be fixed element of CAIs that a DNO will unavoidably incur. If these cost areas are included in any funding transfer to an ICP, the costs would need to funded twice, once for the DNO incurring them and once to fund the payment of this amount to the ICP. DNO business plans would need to factor ICP-completed part-funded reinforcement into their CAI business plans whilst we will need to factor it into our benchmarking and final baseline setting.

9. Business Support Costs

Chapter Summary

This chapter outlines our approach to assessing Business Support Costs (BSCs) in RIIO-ED1. It follows extensive work in this area for RIIO-T1 and GD1 and where appropriate, our intention is to follow a similar approach across all three sectors.

Question 1: Do you agree with our general approach to assessing BSCs? If you disagree with any particular areas can you please specify what these are and your reasons?
Question 2: With regards to the non-fast-track benchmarking, for those DNOs that report lower than the benchmark costs which of the three options for setting cost allowances to you think is most appropriate and why? The options are: increasing allowances to the benchmark level of costs, giving the DNO their submitted level of costs, and taking an average between the benchmark and the submitted costs.
Question 3: Do you agree with the cost drivers set out for each of the categories of Business Support Costs? If not, can you please suggest an alternative?
Question 4: Do you agree with the proposed use of expert review to assess IT&T and property costs?

Introduction

9.1. BSCs are indirect operating that are required to support the overall business.

9.2. In DPCR5, those costs falling into the BSCs were:

- Network Policy
- Human Resources And Non-Operational Training
- Finance and Regulation
- Chief Executive Officer (CEO) and Other Corporate Functions
- IT&T
- Property Management.

9.3. The allowance for BSCs in DPCR5 was £1,764m, approximately 11 per cent of the total cost allowances for the industry.

9.4. BSCs within RIIO-T1 and GD1 price controls were assessed and benchmarked with other network companies' BSCs and external BSC benchmarks. We propose to apply a similar assessment methodology within RIIO-ED1.

9.5. In recent months we have been discussing assessment methodologies with the DNOs in the regular CAWG meetings. The results from these meetings and other views from DNOs and other stakeholders will help shape the final assessment methodology for BSCs.

9.6. Although our proposed assessment methodology detailed below is similar to the one we used in RIIO-T1 and GD1, we will also consider alternative methods or adjustments to the metrics.

Proposed RIIO-ED1 approach

9.7. For RIIO-ED1 it is proposed that Network Policy will be removed from BSCs and placed in the CAIs categories. All remaining five categories listed in paragraph 8.2 above will continue to comprise BSCs. We intend to add the Non-Operational Capex costs of IT&T (including Office Equipment) and Property to the appropriate activities within BSCs.

9.8. The assessment will use a range of techniques including historical and forecast trend analysis, benchmarking of costs across GB networks companies and the use of external benchmark information. A mixture of these techniques will be used in the fast-track and the non-fast-track assessments. In addition, we may seek advice from consultants in specialist areas such as IT and property.

9.9. When reviewing costs we may ask DNOs further questions to seek additional information and clarification. We will also consider whether differences in costs between companies are due to different business models being used and in-sourcing/outsourcing decisions which may affect where costs are reported.

9.10. We will also need to consider any relevant implications of part-funded connections work carried out by ICPs. Where the transfer of DUoS funding from DNOs to ICPs takes place for the BSCs associated with connections reinforcement, there will likely be implications for DNO gross and net positions on BSCs. Where this transfer includes a BSC category that is relatively fixed in the long-term and which a DNO will unavoidably incur regardless of who carries out the work, these costs may need to be funded twice, once for the DNO incurring them and once for the relevant payment to cover the relevant ICP costs.

Fast-track (initial sweep)

9.11. We propose that the onus should be on the DNOs to demonstrate their costs are efficient and justified both in terms of historical and forecast costs. The review would look at evidence provided in the business plans to support their projections of future BSCs, historical levels of BSCs, efficiencies made historically and how forecast levels compare with actual historical performance.

9.12. Our review and conclusions of the robustness of the costs will form part of the overall business plan assessment.

9.13. We anticipate conducting a degree of benchmarking at this stage. This may take the form of looking at BSCs in total or potentially the individual activities that comprise BSCs.

Non-fast-track

9.14. For non-fast-tracked companies we propose that BSCs will be reviewed in more detail. This is likely to entail looking at the historical and forecast costs as in the fast-track process, but at a more disaggregated level than in the initial sweep.

9.15. We expect to establish a historical base year for the analysis, which will be normalised for exceptional cost in the base year and additional justified costs in future years that will impact on business as usual costs over the RIIO-ED1 period. Exceptional factors relate primarily to the base year and exceptional costs in that year which distort a normal typical year's expenditure. Justifiable factors primarily rate to future years where DNOs have justified additional normal expenditure which will occur in future year, eg costs of a new line of work that has to be undertaken.

9.16. We then propose to benchmark the costs against network companies (transmission, electricity distribution and gas distribution) and against the external benchmarks developed for RIIO-T1 and GD1 in collaboration with external consultants. This will be carried out for each activity and then built up to give an overall view of efficient BSCs. We propose that where a DNO's submitted costs are above the benchmark its costs will be reduced to the benchmark level. Where they are below the benchmark there are three options proposed:

- option 1: the allowance is increased to the benchmark level of costs (the approach in RIIO-T1 and GD1)
- option 2: the allowance is given at the level suggested by the DNO
- option 3: the allowance is at an average point between the submitted DNO costs and the benchmark.

9.17. Where a licensee is part of a larger group of companies we propose that the total BSCs that support the regulated businesses will be used for benchmarking purposes. The efficient costs for the whole regulated businesses will be calculated and allocated to individual networks in proportion to their forecast costs. We will also consider the implications of vertically integrated companies on BSCs.

9.18. Table 9.1 details the metrics for various categories of BSCs used in RIIO-T1 and GD1. We welcome views on whether these are appropriate for RIIO-ED1 and on possible alternatives.

Table 9.1: Proposed benchmarks for business support activities

Business Support Category	Suggested Metric
Human Resources and Non-Operational Training	Cost per direct employee
Finance and Regulation	Cost as a per cent of base revenue
CEO and Other Corporate Functions	Cost as a per cent of base revenue
IT&T	Cost per end user within the DNO business
Property Management	Cost as a per cent of base revenue

9.19. DNOs will primarily be benchmarked against the UQ of all network companies. However, for activities where the external benchmarking conducted for RIIO-T1 and GD1 indicates that the networks companies as a whole are inefficient then the UQ of this benchmark comparator group will be used.

9.20. For CEO and Other Corporate Functions we propose using use a composite benchmark of the network companies and the external benchmarking. The reason for this is that network companies in general have greater governance requirements than perhaps other companies face, hence costs are higher. Using a composite benchmark should recognise this.

9.21. We propose that insurance costs within Finance and Regulation will not be benchmarked. This recognises that costs in this area differ significantly between companies due not only to the type of industry they are in, but also the risk different companies choose to take. We would assess these costs for individual DNOs based on historical spend and explanations and justifications given in the business plans.

9.22. For IT&T and Property Management costs while the benchmarking will consider only the opex elements, we also propose to review total spend in these areas (ie include the capex cost elements). This is to ensure that DNOs are not over-spending in the capex element and receiving an opex cost benefit.

9.23. Discussions at the CAWG meetings revealed concerns from the DNOs in using cost per end user (defined as employees) as a cost driver for IT&T. This is because a large proportion of such costs are fixed costs and do not vary by the number of end users. We propose to continue to work with the DNOs through the working group to ensure that the drivers used are appropriate and that we consider fixed and variable elements where required. We would encourage DNOs to propose a suitable alternative cost driver.

9.24. Where the benchmarking suggests that a DNO's submitted costs are inefficient in a particular activity we propose to examine the quality of the efficiency evidence (eg benchmarking, market testing) provided as part of its business plan. The results from this analysis may form an efficiency evidence factor adjustment.

9.25. We envisage carrying out the above assessment based on gross BSCs, but we will also envisage taking a net view of how much DUoS customers typically pay for BSCs.

Expert review

9.26. Depending on the size of forecast expenditure we may use specialist consultants to assist in our assessment. It is likely this will be in two areas, IT&T and Property Management as these are two of the largest cost areas within BSCs.

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

- comparing projected costs against historical costs and looking 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 DNOs, TOs and GDNs.

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

- comparing projected costs against historical costs and looking 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 DNOs, TOs and GDNs
- advising on appropriateness of property related costs required for network infrastructure.

10. Regional and company specific adjustments

Chapter Summary

This chapter explains our proposals for regional and company specific adjustments. It also outlines some of the issues that we expect the DNOs to take account of in their business plans when justifying their proposals.

Question 1: Do you agree with our approach to regional and company specific adjustments?
Question 2: Which regional and company specific adjustments do you think we should consider in RIIO-ED1? Please give a rationale for your suggestions.

Introduction

10.1. Regional and company specific adjustments are adjustments made to a DNO's cost allowances to reflect specific factors that might mean the efficient level of costs is higher in some regions than in others. They apply to costs that are outside the DNOs' control and are applied in advance of any benchmarking and then reversed once the benchmarking has been undertaken.

DPCR5 approach and proposed RIIO-ED1 approach

10.2. The DPCR5 review included a number of adjustments for special factors put forward at that time. Examples of these included:

- regional labour and contractor
- sparsity (such as the Highlands and Islands)
- urbanity
- other DNO specific factors (for example, the extra costs associated with running the interconnected network in Scottish Power: Manweb's (SPMW) area).

10.3. We are minded not to replicate the DPCR5 adjustments unless there is a very strong rationale for doing so. Our rationale for this proposal is that we believe that through the use of a toolkit approach to cost assessment, the impact of such issues should diminish. We are also of the view that many of these issues are for the DNOs to manage, by isolating individual factors and making company specific adjustments we would be favouring shareholders over customers. There are also practical considerations in respect of such adjustments. The more adjustments that DNOs propose before undertaking any assessment, then the longer the fast-track assessment will take. This runs counter to the proportionate approach envisaged by

RIIO. We expect DNOs to pay heed to these points when contemplating any company specific adjustments.

10.4. This was and continues to be a controversial area. For example, several DNOs hold view that regional labour and contactor rates do not differ across the country outside of the greater London area

10.5. Our current view for RIIO-ED1 is that there should be no regional labour or company specific adjustments unless the DNO can satisfy two requirements:

1. That such an adjustment is justifiable, demonstrated by robust and transparent evidence.
2. That the DNO has managed those factors appropriately.

10.6. In line with the RIIO-GD1 approach, the onus is placed firmly on the licensee to justify any proposed adjustments in the submitted business plans.

10.7. It is also important to note that the other RIIO price controls have limited the number of regional adjustments. For instance, in RIIO-GD1, we made only five pre-modelling adjustments to GDNs' costs to reflect regional differences in labour and contractor costs, sparsity adjustments, two urbanity adjustments for London (reinstatement and labour productivity) and a salt cavity adjustment (in the North West).

11. RPEs and ongoing efficiency

Chapter Summary

This chapter outlines the type of analysis that we expect to carry out to assess the forecasts submitted by DNOs for real price effect (RPEs) and ongoing efficiency improvements. It also outlines some of the issues that we expect the DNOs 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 RPEs and ongoing efficiency?
Question 2: Are there any additional data sources that we should be aware of to assist with our analysis in these areas? Are there some that you think we should rely more on than others?

Introduction

11.1. Our cost assessment analysis will help form our view of the efficient level of costs for each DNO. As noted, we propose that this analysis will be on both historical and forecast costs submitted by the DNOs as part of their business plan. The analysis of historical costs can be used to determine an efficient cost level in a particular year. We would need to make a number of adjustments to this level of efficient costs in order to assess the reasonableness of the costs forecast by the companies as part of their business plans. The DNOs would also need to incorporate these factors into their forecasts. These adjustments would need to account for the following factors:

- changes in the volume of activity
- changes in the scope of work that might affect the unit cost of the activity
- expected changes in input prices (for example wages) relative to the Retail Prices Index (RPI) which we refer to as RPEs
- expected productivity improvements to be made by an efficient company which we refer to as ongoing efficiency improvements.

11.2. We address the last two of these issues in this section. It sets out the type of analysis we propose to carry out to assess the forecasts submitted by the DNOs and also the issues that we expect them to take into account when submitting their business plan.

11.3. RPEs and ongoing efficiency were both discussed at the CAWG meetings. It was noted that the inclusion of RPE allowances must distinguish between costs that are subject to uncertainty mechanisms (where they may not appropriate to be included in base allowances) and ex ante allowances (where they are appropriate). We consider that we must be able to split them so that uncertainty mechanisms include associated RPEs if they are to be based on costs in 2011-12 prices.

11.4. It is important that the business plan tables are set up to ensure this separation can be made. It was agreed that both RPEs and ongoing efficiency should be explicit within tables and not embedded. By doing so the net effect of these two opposite factors will be clearly identifiable.

11.5. In DPCR5 we made separate assumptions for ongoing efficiency and RPEs for both Operational Activities and Network Investment:

- 1 per cent a year ongoing efficiency improvement for both operational activities and Network Investment
- average RPEs of 1.1 per cent a year for Network Investment
- average RPEs' of 1.4 per cent a year for Operational Activities.

11.6. Tables 10.1 and 10.2 detail the proposed annual ongoing efficiency and average annual RPE assumptions for RIIO-T1 and GD1.

Table 11.1: RIIO-T1 and GD1 proposed annual ongoing efficiency assumption (2011-12 to 2020-21)[27]

	GDNs	NGET TO	NGGT TO	NGET SO	NGGT SO
Opex	-1%	-1%	-1%	-1%	-1%
Capex	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%
Repex	-0.7%	-	-	-	-
Totex	-0.8%	-0.7%	-0.7%	-0.9%	-0.9%

Table 11.2: RIIO-T1 and GD1 proposed average annual RPE assumption (2011-12 to 2020-21)

	GDNs	NGET TO	NGGT TO	NGET SO	NGGT SO
Opex	0.4%	0.5%	0.6%	0.4%	0.4%
Capex	0.6%	0.9%	0.7%	0%	0%
Repex	0.6%	-	-	-	-
Totex	0.5%	0.8%	0.7%	0.2%	0.2%

[27] NGET = National Grid Electricity Transmission, NGGT = National Grid Gas Transmission, TO = transmission operator and SO = systems operator.

RPEs

11.7. Base revenues are indexed by the RPI as part of the price control. To account for this differential between RPI inflation and expected input price inflation we consider it appropriate to include an additional adjustment to base revenues. We propose this adjustment is made ex ante based on forecast differences between RPI and input price inflation, ie there will be no indexation of base revenues with respect to input prices.

11.8. Our approach to setting assumptions at DPCR5 was to examine historical trends of relevant price indices relative to the RPI to inform our assumptions for RPEs. We propose that this approach should continue and we welcome feedback from stakeholders on the most appropriate price indices we should examine as part of our analysis. In particular if we should look at different indices from those which were covered at DPCR5, RIIO-T1 and GD1. For RIIO-T1 and GD1 assumptions were made for labour, materials, equipment and plant, transport and other.

11.9. In setting RPEs, we propose to focus on the important input prices; all other inputs will be consolidated within an 'other' category.

Labour

11.10. There are a number of labour indices available which reflect historical growth in wages for both the general economy and more specialist industries. We are considering a number of these indices in constructing a labour RPE. When making assumptions on this we will also consider the work completed in RIIO-T1 and GD1. Our RPEs for RIIO-T1 and GD1 were based on data from the Office of National Statistics (ONS) on the average weekly earnings of the private sector economy including bonuses and the HM Treasury consensus forecast.

Materials

11.11. There are a number of indices available that could proxy the changes in cost of the materials that DNOs purchase. As per our proposed approach for establishing a forecast of real labour growth, we propose to draw on indices that we consider best reflect the materials purchased by the network companies. Some examples of these relevant indices are:

- Price index adjustment formulae (PAFI) which represents the changes in contractors costs for specified materials, for example steel works
- Resource cost indices (RCI) which reflect a notional trend in costs of labour, materials and plant
- British Electrotechnical and Allied Manufacturers Association (BEAMA) index of electrical equipment costs
- Producer Price indices (PPI) from the Office for National Statistics (ONS) which represent changes in prices of materials purchased by the manufacturing industry

for processing (input PPI) and changes in prices charged for materials (output PPI)

11.12. In RIIO-T1 and GD1 some of the network companies proposed RPEs based on commodity price forecasts weighted together based on an assumed proportion of each commodity in the goods purchased. For example the RPE for plastic pipe required for the gas sector was made up of crude oil, gas, copper and other materials forecasts.

11.13. We have concerns that this approach does not reflect other factors affecting the price of the goods that the DNOs purchase. Given that the DNOs do not purchase raw materials but the final manufactured good we do not consider that this commodity forecast based approach best represents the potential cost pressures that they will face.

11.14. It should be noted that some network companies also requested an RPE for electricity purchases. We do not consider that an RPE for electricity is required because it constitutes a very low share of network companies' costs.

Equipment and plant

11.15. There are a number of indices available that could proxy the change in costs of the equipment and plant that DNOs use. When making assumptions on equipment and plant RPE we propose to consider the work completed in RIIO-T1 and GD1 price controls as we do not consider that the growth in equipment and plant for these industries will be materially different.

Transport

11.16. The RIIO-T1 and GD1 network companies' business plans assumed a range of RPE assumptions for transport, ranging from no RPE to an assumed 41 per cent increase in costs by the end of the RIIO-T1 and GD1 periods. Through the work completed for RIIO-T1 and GD1 we would assume a zero RPE for transport costs in RIIPO-ED1 as it constitutes a relatively minimal element of DNOs' costs. Based on historical trends in relevant indices, we also consider that there is no evidence that transport cost inputs prices will be materially different from RPI.

Other

11.17. Our assumption for the other category is that costs will grow in line with RPI and thus there will be a zero RPE. We consider that the RPEs discussed in the rest of this chapter reflect the material categories where there is a valid expectation of materially different growth than that of the RPI.

Ongoing efficiency

11.18. The ongoing efficiency assumption is a measure of the productivity improvements that are expected to be made by the DNOs over the price control period.

11.19. The analysis is intended to 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 while 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.

11.20. 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)) 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 will be those with similarities to the DNOs, for example the sectors with significant asset management roles. When making assumptions on ongoing efficiency we will consider the work completed in RIIO-T1 and GD1 price controls.

11.21. There are other sources of evidence that we also propose to examine. For example, the 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 capital expenditure activities undertaken by the DNOs.

12. Data assurance and compliance

Chapter Summary

This chapter summarises our views on data assurance and compliance including the expectations placed on the DNOs and the consequences of submitting data to Ofgem that is inaccurate, incomplete or late.

There are no questions in this chapter.

Data assurance

12.1. As has always been the case it is incumbent upon DNOs to provide Ofgem with data that is complete, accurate and on time. To enable DNOs to meet these requirements, we expect that each DNO has appropriate systems, processes, and procedures in place. This includes ensuring that an appropriate data assurance activity for each submission is followed. Such activities include, for example, external audit, internal audit, director sign off and management review.

12.2. The level of the data assurance activity should be proportionate to the type of submission. Unless a data assurance activity is specified within the Electricity Distribution Licence for a particular submission, we would expect DNOs to undertake a data assurance activity that is based on an informed risk assessment. We are currently working with the DNOs to develop this during a trial period in DPCR5.

Quality and timeliness of data

12.3. We are mindful of that fact that there are occasions where inaccurate or incomplete data may be submitted to us, despite the DNOs following appropriate data assurance activities. While it is prudent for Ofgem to give DNOs the opportunity to amend minor errors (that may have a material impact), in our view this should of necessity be time limited. Consistent and/or significant errors in the data submitted to Ofgem will be taken into consideration when we assess the business plans. It is likely to be extremely difficult for DNOs that consistently submit erroneous data to Ofgem to be fast-tracked.

12.4. We expect that where DNOs identify errors in their submissions that they inform us immediately. This applies to both recently submitted data and historical data.

12.5. As in DPCR5, in RIIO-ED1 we intend to record for each submission if it was received on time and if it was complete and accurate. We will also record the number and timing of resubmissions. This record will be used to the take the appropriate action against poorly performing DNO, which may range from a warning letter to full enforcement action.

RIIO-ED1 and ongoing work

12.6. For RIIO-ED1 we propose to bring together all data assurance requirements under the one licence condition (rather than being throughout the licence). In doing so, this places greater focus on the importance of data assurance. Its overarching purpose is to reduce the risk, and subsequent impact of, inaccurate reporting and misreporting on all stakeholders, for example customers, Ofgem, and the DNOs. The rationale is that each DNO will be able to determine a data assurance plan that is bespoke to their needs/issues (although Ofgem is likely to specify a minimum data assurance activity for particular submissions).

12.7. We are currently developing licence conditions with the transmission operators and gas distribution networks and the DNOs have been part of this process. While a full strategy consultation process will be adhered to for all RIIO-ED1 licence conditions, we aim to be as consistent as possible across all three sectors with regards to the data assurance licence condition. This condition is likely to place obligations on the DNOs to:

- provide accurate and complete data to Ofgem
- provide data on time
- have and maintain appropriate systems, processes, and procedures to ensure the provision of accurate, complete and timely data
- carry out a data assurance risk assessment and mitigate against risk for each submission (ie the higher the impact and likelihood of risk, the more stringent the data assurance should be)
- provide a risk assessment report
- provide a forward looking report that details the data assurance plan for the year ahead
- provide a backwards looking report on what was undertaken, what lessons have been learnt and what actions have been taken to improve data assurance in going forward

12.8. We have been working with the DNOs during a trial in DPCR5 intended to inform our approach to data assurance for RIIO-ED1. It is intended that this group will evolve into a RIIO-ED1 working group on data assurance.

12.9. The trial is at a relatively early stage and there a number of issues that we will continue to work through with the DNOs, such as the composition of the risk assessment and the level of detail within the Regulatory Reporting Packs at which we would expect data assurance to be undertaken.

Appendices

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Appendix 1 - Consultation response and questions

1.1. Ofgem would like to hear the views of interested parties in relation to any of the issues set out in this document.

1.2. We would especially welcome responses to the specific questions which we have set out at the beginning of each chapter heading and which are replicated below.

1.3. Responses should be received by 23 November 2012 and should be sent to:

James Hope
Electricity Distribution Costs and Outputs
Ofgem, 9 Millbank. London, SW1P 3GE
020 7901 7029
RIIO.ED1@ofgem.gov.uk

1.4. Unless marked confidential, all responses will be published by placing them in Ofgem's library and on its website www.ofgem.gov.uk. Respondents may request that their response is kept confidential. Ofgem shall respect this request, subject to any obligations to disclose information, for example, under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004.

1.5. Respondents who wish to have their responses remain confidential should clearly mark the document/s to that effect and include the reasons for confidentiality. It would be helpful if responses could be submitted both electronically and in writing. Respondents are asked to put any confidential material in the appendices to their responses.

1.6. Next steps: Having considered the responses to this consultation, Ofgem intends to discuss the issues further at the forthcoming CAWG meetings before publishing our Decision Document in February 2013. Any questions on this document should, in the first instance, be directed to:

- James Hope
- Electricity Distribution Costs and Outputs
- Ofgem, 9 Millbank. London, SW1P 3GE
- 020 7901 7029
- ElectricityDistribution.CostsandOutputs@ofgem.gov.uk

CHAPTER: Two

Question1: Do you consider our overall approach to cost assessment appropriate and what changes, if any, would you propose?
Question 2: Do you think Ofgem should take into account poor historical performance in its assessment of business plans, and if so, how?

CHAPTER: Three

Question1: Do you agree with the use of totex benchmarking for RIIO-ED1 and what are your reasons?
Question 2: Do you agree with the use of a capital expenditure as opposed to capital consumption approach for measuring total costs?
Question 3: Do you agree with using a similar approach to the top-down model used in RIIO-GD1, considering the adjustment for regional factors, the use of a composite cost driver, and the use of the upper quartile (UQ) to determine efficient costs?
Question 4: Do you believe it is appropriate to use a middle-up totex model and if so, do you agree with following the principles of the GD1 approach?
Question 5: What level of disaggregation do you believe is appropriate for the middle-up model to provide a useful comparator to the top-down totex model?
Question 6: How do you believe lumpy expenditure should be treated in totex modelling?

CHAPTER: Four
Question 1: Do you believe it is appropriate to use a bottom-up, disaggregated model to compare with the totex model results?
Question 2: Do you agree with our approach to the disaggregated, bottom-up model?

CHAPTER: Five

Question 1: Do you agree with our proposed approach to how the specific building blocks that make up load related expenditure interact as well as which categories are proposed to be included in a load related reopener?
Question 2: Which of the three options set out for assessing connection-related costs within the price control do you feel is the most appropriate and why? Please reference the following in your answer:

d) the gross cost assessment adjusted for net-to-gross ratio or just on the Distribution Use of system (DUoS) funded reinforcement costs
e) the most appropriate cost driver for connection reinforcement costs: Meter Point Administration Numbers (MPANs) or number of connection projects
f) the most appropriate approach for assessing cost of low volume high cost (LVHC) connections.

Question 3: Which of the three options set out for assessing wayleaves and diversionary-related costs within the price control do you feel is the most appropriate and why?
Question 4: For all general reinforcement, is it feasible for the DNOs to provide specific scheme lists based on commonly agreed demand scenarios in RIIO-ED1?
Question 5: For all general reinforcement, do you think that reinforcement specifically relating to generation should be separately assessed from demand-related reinforcement?

Question 6: Do you agree with our proposed modelling approach to cost assessment of n-1 reinforcement schemes, specifically in relation to the two proposals for the Load Index (LI) delivery as outlined in Chapter 4 in the 'Supplementary annex – Reliability and Safety'?
Question 7: Do you agree that expenditure on secondary network reinforcement is no longer highly correlated with localised economic growth?
Question 8: Do you believe that it is feasible and appropriate to set definitions and unit cost(s) for the following:
d) the conversion of wayleaves to easements and injurious affection payments;
e) load related interventions on the secondary network; and
f) fault level reinforcement?
Question 9: What is the most appropriate funding mechanism for load related expenditure on the secondary network?

CHAPTER: Six

Question1: Do you agree with our approach for assessing NLRE in the companies' business plans?
Question 2: In light of our proposals, do you agree with our selection of risk removed as the primary output of the mains replacement programme?
Question 3: Do you agree with our approach to remove non-modelled costs in RIIO-ED1?
Question 4: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on Legal and Safety? If not, what changes would you propose?
Question 5: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on ESQCR? If not, what changes would you propose?
Question 6: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on flooding? If not, what changes would you propose?
Question 7: Do you agree with our proposed approach not to fund Quality of Service (QoS) improvements during RIIO-ED1?
Question 8: Do you agree with our proposed approach to change Black Start and Rising and Lateral Mains (RLM) from reopener mechanisms to ex ante allowances?
Question 9: Do you agree with our approach to assessing enhanced physical site security costs?

CHAPTER: Seven

Question1: Do you think that our proposals for the Trouble Call are proportional given the materiality of the area and do you have any preference between the options? Please separate your response by the following categories: low and high voltage overhead faults; low and high voltage underground faults; EHV and 132kV faults; ONIs (formerly non-QoS faults); third party cable damage recovery; pressure assisted cables; and submarine cables.
Question 2: Do you agree with our approach to assessing Severe Weather 1 in 20 Events and do you have any preference between the options?
Question 3: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on Inspection and Maintenance (I&M)? If not, what changes would you propose?

Question 4: Do you agree with our proposed approach for assessing the DNOs' plans for expenditure on Tree Cutting? If not, what changes would you propose?
Question 5: Do you agree with our approach to assessing NOCs Other and do you have any preference between the options? Please separate your response by the following categories: dismantlement, remote location generation, and substation electricity.

CHAPTER: Eight

Question1: Do you agree with our proposed approach to assess CAIs? In particular, do you agree with our groupings of activities?
Question 2: Are there any views as to which cost drivers would be most appropriate?
Question 3: Do you believe our approach to assessing Workforce Renewal is appropriate? In particular, do you believe it is appropriate to consider Workforce Renewal allowances both in isolation and also as part of wider training and do you believe Workforce Renewal should include or exclude the training of contractors?

CHAPTER: Nine

Question1: Do you agree with our general approach to assessing BSCs? If you disagree with any particular areas can you please specify what these are and your reasons?
Question 2: With regards to the non-fast-track benchmarking, for those DNOs that report lower than the benchmark costs which of the three options for setting cost allowances to you think is most appropriate and why? The options are: increasing allowances to the benchmark level of costs, giving the DNO their submitted level of costs, and taking an average between the benchmark and the submitted costs.
Question 3: Do you agree with the cost drivers set out for each of the categories of Business Support Costs? If not, can you please suggest an alternative?
Question 4: Do you agree with the proposed use of expert review to assess IT&T and property costs?

CHAPTER: Ten

Question1: Do you agree with our approach to regional and company specific adjustments?
Question 2: Which regional and company specific adjustments do you think we should consider in RIIO-ED1? Please give a rationale for your suggestions.

CHAPTER: Eleven

Question1: Are there any additional analytical techniques that we should consider beyond those we have used at past price control reviews to assess RPEs and ongoing efficiency?
Question 2: Are there any additional data sources that we should be aware of to assist with our analysis of RPEs and ongoing efficiency? Are there some that you think we should rely more on than others?

Appendix 2 – Proposed RIIO-ED1 cost assessment structure and method

The table below provides a summary of the proposed tools and cost assessment method. Our proposed list of tools does not prohibit us from introducing new tools for a specific area of activity. In particular, there may be areas which are suitable for CBA but given that we are currently consulting on appropriate areas for CBA, not all these have yet been identified.

	Sub-category	**Activity**	**Tools**	**Proposed cost assessment method**
Totex (capex + opex)	NA	NA	• Totex econometric benchmarking • Disaggregated econometric benchmarking	• Top-down model based on a small number of composite cost drivers. • Middle-up model based on composite cost drivers by a number of groups. • Bottom-up model based on cost drivers at a disaggregated level will provide a comparator. The benchmark for all models, and the component parts of them, will set at the UQ.

Capital Expenditure (capex)	Network Investment - Load Related Expenditure (LRE)			• Reopener if expenditure above or below 20 per cent of cost baselines (excluding diversions and HVPs).
				• Primary network:
				  ○ ex ante allowance linked to agreed delivery of LI deliverable.
				• Secondary network options:
				  ○ volume driver for Low carbon technology take up
				  ○ volume driver for specific interventions.
				• For connection projects:
				  ○ all installations of LCTs connected through connection project funded as connection.
				• HVPs separately subject to HVP reopener and not eligible for load related reopener.
				• Load related true up across all categories for the

				difference between forecast and actual customer contribution.

Capital Expenditure (capex)	Network Investment - Load Related Expenditure (LRE)	Connection Projects	• Disaggregated econometric benchmarking
			• Asset condition and criticality data
			• Individual project review
				• No discrimination between demand and generation in terms of the treatment of connection costs as in DPCR5.
				• Option 1: connection cost assessment approach same as per DPCR5
				  ○ HVLC connections operate within volume driver mechanism against exit points provided. Small-scale LV and other LV benchmark unit cost set using UQ benchmark unit cost
				  ○ LV involving HV benchmark unit cost set using UQ benchmark unit cost LVHC connections operate as an ex ante allowance based on detailed review of proposals.
				• Option 2: connection projects within each of the metered market segments operate as a volume driver with a benchmarked unit cost of reinforcement set for a project within each segment.
				• Option 3: combination of approaches:
				  ○ Connection projects involving primary network reinforcement based on £ per mega volt-ampere (MVA) of capacity added as benchmarked through general reinforcement modelling
				  ○ Remaining connection projects operate in volume driver as detailed in either option 1 or 2 above.
				• Allow for DUoS funding to be transferable to ICPs.

		Diversions, Wayleaves and Easements (including previous CAI element)	• Disaggregated econometric benchmarking • Trend analysis	Grouped as: 1. Conversion of wayleaves to easements and injurious affection payments 2. Diversions due to wayleave terminations 3. Diversions due to NRSWA (New Roads and Street Works Act)

				For 1 and 2, three options: • Option 1: two volume drivers; one for conversion of wayleaves to easements and injurious affection and one for diversions. The unit costs would need to be based on the benchmarked cost of covering the relevant payments and legal fees. • Option 2: set baselines on historical cost data and forecast developments in the number of claims over time. • Option 3: set baselines on historical cost data with a volume driver based on benchmarked unit cost that can be triggered where the volume of claims is significantly higher or lower than set out in the business plan. • Also, considering whether to combine 1 and 2. For 3: • Set baselines on historical cost data and forecast developments in the number of claims over time.

		General Reinforcement	• Disaggregated econometric benchmarking
			• Asset condition and criticality data
			• Individual project review
				Grouped based on cost drivers as:
				1. General Reinforcement (EHV and 132kV n-2)
				2. General Reinforcement (EHV and 132kV n-1)
				3. General Reinforcement (HV and LV).
				For 1, as in DPCR5, exclude load related modelling and individually assessed.
				For 2:
				• Continue with DPCR4 and DPCR5 two-stage modelling:
				  ○ Benchmark the average DNO ratio of capacity (MVA) forecast to be added by DNO nominated schemes to the network to the forecast MVA growth in maximum demand at these sites
				  ○ Use the MEAV of each DNO to benchmark the ratio of cost of new capacity added to the historical MEAV value of the capacity already in place

				○ For non-fast track assessment, review elements of individual schemes through the asset replacement new-build unit costs. • For 3, change approach due to unknown implications of low carbon technologies for LV reinforcement. Two options: ○ Option1: baseline set on unit cost of MW of low carbon technologies multiplied by volume; cap and collar on amount of reward/penalty against the cost per MW unit cost; and potential reopener or amended unit cost. ○ Option 2: baseline based on forecast number of load related interventions/problems solved; unit cost set on cost of a problem solved; true up mechanism set for ± 20 per cent on forecast problems solved. • Note: General Reinforcement will include the practical alternatives to reinforcement for accommodating demand growth (eg DSR).
		Fault Level Expenditure	• Disaggregated econometric benchmarking	Initial baselines based on known issues affecting the network and attach a volume driver mechanism to ensure that this level of allowance is adjusted to reflect the level of low carbon technology uptake on the network.
		High Value Projects	• Expert review • Individual project review	• Retain an ex ante allowance as in DPCR5 but contingent on DNOs providing sufficient needs case. • Retain a threshold value but review its level for RIIO-ED1. • In addition to the ex ante allowance, retain a reopener mechanism for managing the uncertainty associated with large investment projects. ○ would apply to the totality of HVPs within the price control and not to individual projects. ○ DNOs could trigger the reopener during the window if they can demonstrate that they have/will meet the associated outputs included

				in their baseline allowance and that their net efficient expenditure over the entire RIIO-ED1 period on HVPs is 20 per cent greater than the Ofgem baseline.
	Network Investment – Non-Load Related Expenditure (NLRE)	Asset Intervention	• Asset intervention modelling • Trend analysis • Expert review	Largely the same as DPCR5, ie: • An asset replacement model to benchmark the DNOs' replacement volumes and expenditures • For areas not amenable to replacement modelling, analyse unit costs and expenditure trends, and expert review (although we propose this to be less than in DPCR5 through expanding the scope of volume and unit cost benchmarking). • Use of output measures of health indices and asset fault rates. Regression analysis will be used to consider the efficiency of unit costs and expenditure not covered by asset replacement modelling. This should remove the need for non-modelled costs.
		Operational IT and Telecoms	• Expert review	As in DPCR5, use expert review and for RIIO-ED1 to now include a review of the indirect IT&T costs, which would also now include the associated non-operational capital expenditure.
		Legal and Safety	• Disaggregated econometric benchmarking • Trend analysis	• Site security: as per DPCR5, assess trends in the level of activity to determine forecasts. Considering benchmarking unit cost to DNO volume forecasts. • Other areas (asbestos management, safety climbing fixtures, fire protection, earthing upgrades, metal theft remedial work, other areas as specified by the DNOs): as in DPCR5, run-rate analysis, unit cost analysis, scheme analysis and benchmarking to assess the DNOs forecast plans.
		ESQCR	• Individual review	• Consider as business as usual. • DNOs to model their efficient costs for maintaining clearances; no catch-up allowances will be permitted.

				• Review individual volumes and costs (difficulty in benchmarking due to limited DNO activity in this area).
		Quality of Supply (QoS)	NA	As in DPCR5, no ex ante allowances.
		Non-core ex ante (Flood mitigation, BT21CN, High Impact Low Probability, losses, oil pollution, SF6 leakage, other environmental, Rising and Lateral Mains, Black Start)	• Disaggregated econometric benchmarking • Trend analysis • Expert review • Individual project review • CBA	• Flood mitigation: as per DPCR5 but use UQ benchmarking for costs or if not possible, industry average, and exclude site survey expenditure from the allowance. • BT21CN: with the exception of SP no expenditure is expected from DNOs in RIIO-ED1. For SP, as in DPCR5, DNOs we will use BT forecasts to set allowance. • HILP: as per DPCR5, look at forecasts on an individual DNO basis. • Losses, oil pollution, SF6 and other environmental: CBA to be submitted by DNOs. The same applies to any new environmental areas identified in RIIO-ED1. • RLMs: no longer a reopener mechanism but an ex ante allowance. Set allowances based on the approach used for reviewing the DPCR5 reopener applications (currently being reviewed). • Black Start: no longer a reopener mechanism but an ex ante allowance. Agree a technical standard for which DNOs will use to prepare forecast costs.
		Non-core re-opener: Enhanced physical site security (previously	• Uncertainty mechanism	• To remain a reopener as in DPCR5.

		CNI)		
Operating expenditure (Opex)	Network Operating Costs (NOCs)	Trouble Call	• Disaggregated econometric benchmarking • Trend analysis	**LV and HV overhead faults and LV and HV underground faults:** • Option 1: re-use the DPCR5 econometric modelling approach but benchmark at the UQ and at the most detailed levels using the new RIGs (for example splitting the data by voltage and by overhead, underground, switching or plant and equipment). • Option 2: use historical volume and unit cost data to set a unit cost benchmark (based on UQ) and apply this to the DNOs' forecast volume. • Option 3: determine efficient costs and also tie volumes to either agreed secondary deliverables or IIS fault rate benchmarking. **EHV and 132kV faults** • Option 1: as per DPCR5 but at the most detailed level and also setting the benchmark at the UQ. • Option 2: use the ten year average fault rate calculated as part of the IIS target setting mechanism and then apply average cost per fault. • Option 3: use historical volume and unit cost data to set a UQ benchmark unit cost and apply this to the DNOs' forecast volume. **ONIs (formerly non-QoS faults):** • Option 1: re-use the DPCR5 approach but with UQ benchmark. • Option 2: use benchmarking like with Option 2 of the LV and HV fault assessment. **Third party cable damage recovery** • Maximum of forecasts and historical average. **Pressure assisted cables** • Option 1: as per DPCR5 to pro rate a proportion of the cost between faults and I&M against the combined cost for these assets. Take a minimum of each DNO's own forecast costs and each DNO's average of actual

				reported costs from 2005-06 to 2008-09 with a one per cent efficiency glide path for the DPCR5 period. • Option 2: combine with our main fault rate assessment. **Submarine cable faults** As per DPCR5, set cost baselines at the minimum of the average annual forecast for DPCR5 and the annual actual costs reported for the previous years. The analysis for trouble call will be combined with the work on asset intervention and I&M.
		Severe Weather-Atypical	• Trend analysis	Re-use DPCR5 allowance and update for inflation.
		Inspections and Maintenance	• Disaggregated econometric benchmarking • Trend analysis	• Three separate asset categories were assessed - pressure assisted cables, submarine cables and urban specific. • Refine DPCR5 approach. For volumes to take the minimum of each DNO's own forecast costs and the industry average of actual historical volumes with a one per cent efficiency glide path applied for the DPCR5 period. For costs benchmark at the UQ unit cost. • Suggested refinements include a different approach to assessing submarine cables, the relevance of keeping a separate urban specific category of assets and a review of the frequencies proposed for I&M work. • The analysis for I&M will be combined with the work on asset intervention and trouble call.
		Tree Cutting	• Disaggregated econometric benchmarking • True up mechanism	• Base allowances on the DNOs' forecast number of spans managed and cut. • Benchmark volumes and unit costs of spans cut and spans managed. • True up mechanism which will adjust the level of allowance should the ratio of spans managed and cut

				change. This will contain a built in tolerance level.
		NOCs Other - substation electricity	• Disaggregated econometric benchmarking	Benchmark the average usage per site, and multiply by the UQ pence per unit consumed.
		NOCs Other - dismantlement	• Disaggregated econometric benchmarking • Trend analysis	As per DPCR5, set allowance at the minimum of the forecast or the average of the actuals (with a one per cent annual efficiency saving). UQ benchmark not possible due to limited activity.
		NOCs Other - remote location generation	• Disaggregated econometric benchmarking • Trend analysis	As per DPCR5, set allowance at the minimum of the forecast or the average of the actuals (with a one per cent annual efficiency saving). UQ benchmark not possible due to limited activity
	Closely Associated Indirects (CAIs)	Network Design and Engineering	• Disaggregated econometric benchmarking • Trend analysis	Two options proposed: Option 1: Similar approach to DPCR5 placing activities into two distinct groups: • Group A: Network Design and Engineering, Project Management, System Mapping – Cartographical, Vehicles & Transport and Small Tools & Equipment & Plant & Machinery. Assessed as one Group with a common composite cost driver and allowances based on the UQ benchmark. • Group B: Engineering Management and Clerical Support, Control Centre, Call Centre, Stores, Operational Training (including Workforce Renewal) and Network Policy. Assessed as one Group with a common composite cost driver and allowances based on the UQ benchmark. Option 2: Group disaggregated CAI activities by their aligned cost driver and allowances based on the UQ benchmark.
		Project Management		
		System Mapping - Cartographical		
		Vehicles and Transport (including previous DPCR5 non-op capex element)		
		Small Tools and Equipment and Plant and Machinery (previously in non-op capex)		
		Engineering Management		

		and Clerical Support		
		Control Centre		
		Call Centre		
		Stores		
		Operational Training (including Workforce Renewal)		
		Network Policy (previously in BSCs)		
		TMA	• Disaggregated econometric benchmarking • Trend analysis • Expert review • Individual project review • Uncertainty mechanisms	As per DPCR5: • Exclude any permitting costs (assessed as part of a reopener) and exclude admin costs (included within indirect expenditure). • Volumes forecast by the DNOs for the number of notifications and inspections. • For other costs (one-off set up costs, lane rentals, overstay fines, and congestion charge payments) allow the DNOs' forecasts, if justified.

	Business Support Costs (BSCs)	HR and Non-operational Training	• Disaggregated econometric benchmarking
			• Expert review
				• All subject to UQ benchmark with different metrics adopted. Suggested metrics are:
				  • HR and Non-operational Training – cost per direct employee
				  • Finance and Regulation - cost as a per cent of base revenue
				  • CEO - cost as a per cent of base revenue
				  • IT&T - cost per end user within the DNO business
				  • Property Management - cost as a per cent of base revenue.
				• Both IT&T and Property Management will use expert review.

		Finance and Regulation		
		CEO		
		IT&T (including previous DPCR5 non-op capex element)		
		Property Management (including		

		previous DPCR5 non-op capex element)		
		Insurance	• Individual project review	Exclude from benchmarking. Assessed each individual DNO separately.

Appendix 3 – DPCR5 allowances

Sub-Category	Activity	Total DPCR5 allowance (£m) (2011/12 prices)	As % of DPCR5 allowance	% of sub category
Network Investment - Load Related Expenditure (LRE)	Connection Projects	407.7	3%	5%
	Diversions	371.8	2%	5%
	General Reinforcement	1298.7	8%	17%
	Fault Level Expenditure	149.6	1%	2%
	High Value Projects	285.0	2%	4%
	Total LRE	**2512.8**	**16%**	**33%**
Network Investment - Non Load Related Expenditure (NLRE)	Asset Replacement	4126.5	26%	54%
	LV	808.7	5%	11%
	HV	1519.3	10%	20%
	EHV	871.0	6%	11%
	132kV	927.5	6%	12%
	Operational IT and Telecoms	120.6	1%	2%
	Legal and Safety	101.5	1%	1%
	ESQCR	320.7	2%	4%
	Quality of Supply (QoS)[28]	33.4	0.2%	0.4%
	Non-core ex ante (Flood Mitigation, BT21CN, High Impact Low Probability, Oil Pollution, SF6 leakage, Environmental Other, Technical Losses)	331.0	2%	4%
	Non-core reopener	29.8	0.2%	0.4%
	Rising and Lateral Mains	29.8	0.2%	0.4%
	Black Start	-	-	-
	Critical National Infrastructure	-	-	-
	Total NLRE	**5063.4**	**32%**	**67%**
	Total Network Investment	**7576.2**	**48%**	**100%**

[28] The £29.3m accounts for applying the IQI mechanism (Ofgem 75%, DNO 25%) to the DNOs DPCR5 forecasts. There was no ex ante allowance.

Network Operating Costs (NOCs)	Trouble Call	1439.0	9%	48%
	Severe Weather- Atypical	160.5	1%	5%
	Inspections and Maintenance	606.3	4%	20%
	Tree Cutting	607.6	4%	20%
	NOCs Other - substation electricity	108.8	1%	4%
	NOCs Other - dismantlement	37.6	0.2%	1%
	NOCs Other - remote location generation	26.1	0.2%	1%
	NOCs Other - submarine cables	5.4	0.0%	0.2%
	Total NOCs	**2991.2**	**19%**	**100%**
Closely Associated Indirects (CAIs)	Network Design and Engineering	239.1	2%	8%
	Project Management	289.5	2%	10%
	Engineering Management and Clerical Support	842.8	5%	30%
	System Mapping - Cartographical	70.0	0.4%	2%
	Control Centre	170.7	1%	6%
	Call Centre	89.9	1%	3%
	Stores	92.1	1%	3%
	Operational Training	82.9	1%	3%
	Workforce Renewal	213.9	1%	8%
	Vehicles and Transport	448.3	3%	16%
	Wayleaves	227.3	1%	8%
	Traffic Management Act (TMA)	81.9	1%	3%
	Total CAIs	**2848.3**	**18%**	**100%**
Business Support Costs (BSCs)	Network Policy	52.2	0%	3%
	HR and Non-operational Training	124.7	1%	7%
	Finance and Regulation	491.9	3%	28%
	CEO	127.7	1%	7%
	IT and Telecoms	655.3	4%	37%
	Property Management	311.3	2%	18%
	Insurance	1.0	0.0%	0.1%
	Total BSCs	**1764.0**	**11%**	**100%**
Non-Operational Capex	IT&T	231.7	1%	42%
	Property	88.6	1%	16%
	Office Equipment	-	-	-
	Vehicles	131.1	1%	24%
	Plant and Machinery	10.3	0%	2%
	Small Tools and Equipment	85.7	1%	16%
	Total Non-Op Capex	**547.4**	**3%**	**100%**
Total		**15,727.1**	**100%**	

Appendix 4 – Preferred econometric approach

Introduction

1.1. This appendix details our preferred econometric approach. It largely follows the approach used for RIIO-GD1 and covers the following:

- Preferred method
- Functional form and model specification
- Goodness of fit
- Quality of cost drivers
- Statistical testing (including the treatment of outliers).

Preferred method

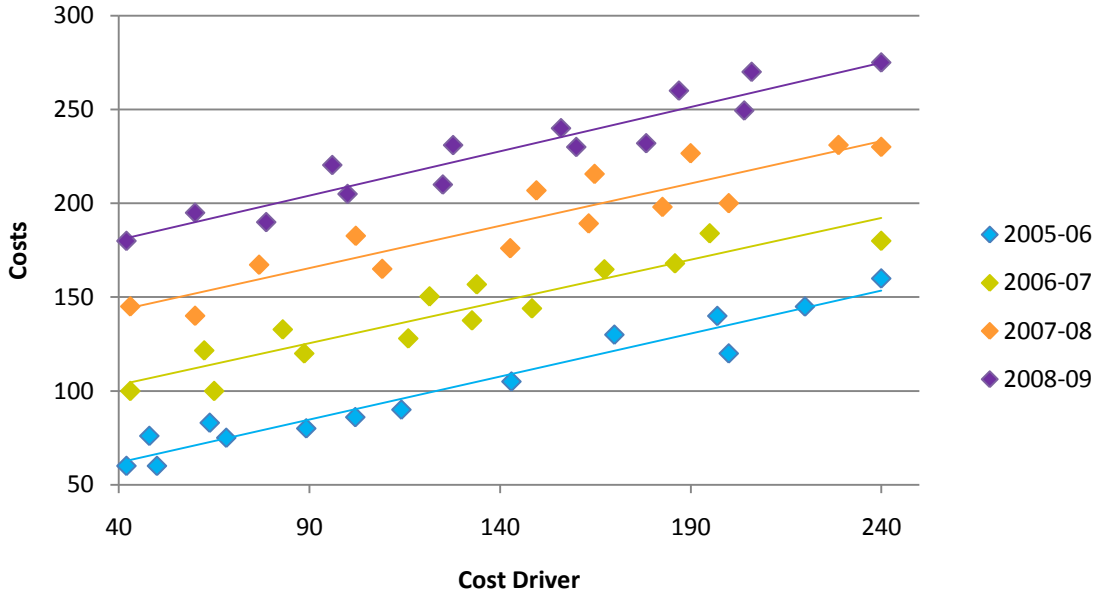
1.2. For our regressions we use panel data estimated with the ordinary least squares (OLS) estimator and including time fixed effects.

1.3. For our regressions we use panel data estimated with the ordinary least squares (OLS) estimator and including time fixed effects

1.4. Given the number of comparators the process of company-specific adjustments is undertaken prior to model estimation. In other words we use a time fixed effects rather than a DNO fixed effects estimator. However, we recognise that the sample is comprised of 14 firms over a period of up to 13 years comprising three years of historical data and 12 years of forecasts. Therefore it will utilise appropriate (cluster-based) standard errors when estimating cost relationships and calculating the accuracy of the standard errors. We will consider whether it is appropriate to combine historical and forecast data and what period of forecasts is sufficiently robust for this purpose as part of carrying out our analysis.

1.5. When a time fixed-effects model is estimated, one can calculate the expected/average cost of performing an activity in a given year. Where DNOs' actual/forecast costs lie relative to this average level provides an indication of their efficiency relative to this average. This is illustrated in Figure A4.1.

Figure A4.1: Illustration of a time fixed-effects model



1.6. The following can be seen from this illustration.

- The cost driver has the same effect in all years. In this example an extra unit of the cost driver coincides with an extra unit of costs for all years
- There are time specific fixed effects that lead to different average costs in each year. In this example average costs have increased from year to year.
- An indication of the relative efficiency of a DNO can be obtained by comparing the modelled costs with the average costs in that year for a given cost driver. For example, companies that lie above the fitted line have higher than average costs for that level of cost driver and this indicates that we might expect them to be less efficient than average.

Functional form and model specification

1.7. We propose to use the Cobb-Douglas functional form. It is one of the most common cost functions employed in empirical cost research and its simplest form is represented as:

$$Log(Y) = C + \beta * log(X) + \varepsilon$$

Where: Y is the measure of costs – eg totex; X is the cost driver – eg network length; β is the slope value and C is a constant; ε is the error term (unexplained costs), and log is the natural logarithm.

1.8. The above functional form can also be adapted and used with data in their level format by removing the log function. We are considering using the set of criteria used for RIIO-GD1 for selecting the best functional form for each model we estimate.

Criteria for selecting regression models

1.9. This criteria for selecting the regression models in RIIO-GD1 was as follows:

- The goodness of fit of the models (discussed below).
- Qualitative information on the quality of data we have for cost drivers and other explanatory variables that fed into the models. For example, if the data for an explanatory variable is known to be of poor quality (eg a rough estimate made by the companies) then we may prefer an alternative model which does not suffer from this deficiency.
- The functional form of the model must make intuitive sense – ie the form of the relationship between the costs and the drivers must be plausible.
- The magnitude and sign of the estimated coefficients must make sense – the interpretation of these coefficients must be consistent with our knowledge of the sector.
- The estimated relative efficiencies must be plausible – based on the activity there is a reasonable range within which costs can be expected to vary for efficiency reasons.
- The statistical test results (discussed below).

Measures of goodness of fit

1.10. Measures of fit tell how well an estimated model fits the actual data. However, a given measure of goodness of fit does not indicate whether a model should be used or not. Our ultimate aim is to estimate relative efficiency, and as such there is no target level for the goodness of fit. While it is desirable to explain the differences between companies that are not as a result of differences in efficiency, the model selection process should not rely on only maximising the goodness of fit. The other model selection criteria listed above are just as important and should not be overridden.

1.11. The most common used measure is R-squared. It measures the proportion of the variance of the dependent variable that is explained by the explanatory variables in the model.

1.12. The value of R-squared ranges from 0 to 1. It is 0 if the only explanatory variable is a constant term and 1 when all variations in the dependent variables are accounted for by variations in the explanatory variables making the regression residuals all equal to zero. R-squared can thus be thought of as a measure of how well the model performs compared to a simple model with just a constant term.

1.13. R-squared however has some limitations that must be noted. A comparison of R-squared is only meaningful when the dependent variables are the same. To

compare models with different dependent variables (eg costs and log of costs) it is necessary to put them on like terms and compare how well they both predict costs.

Quality of cost drivers

1.14. We will work with the DNOs to ensure the robustness of the regressions. We will do this by seeking to continue the work in DPCR5 to improve the consistency of reporting and therefore the comparability of data and developing suitable cost drivers.

1.15. In some cost assessment areas we may make use of composite scale variables (CSV) that encompass a wider range of the factors influencing costs than can be captured by a single driver. We propose to construct a CSV to estimate the weights for each driver when:

- the sample is too small to handle multiple drivers, and/or
- some of the explanatory variables are statistically insignificant, but both our engineering knowledge and other industry understanding gives us good reason to believe that combining them into one variable could account for changes in costs better.

1.16. We will test alternative drivers and different weightings for each of the regressions and share these with the DNOs. For each of the activity areas we propose to use scatter plots to consider the correlation between the costs and each of the cost drivers. Where we plan to use CSV we will identify the appropriate weightings using regression analysis. From this, we should find the most appropriate and robust drivers.

Statistical tests

1.17. We intend to use the statistical tests which Ofgem developed for DPCR5 and used in RIIO-GD1. These tests provide an indication of the robustness of the modelled results and also indicate where some of the outputs from the regressions might be biased and require an adjustment to avoid misleading results. We propose to investigate the outcome of the statistical tests and make appropriate adjustments. We also intend to use the results from these tests to feed into our judgement in identifying the best models. The tests are:

- White test for heteroscedasticity, to ensure robust inference
- F-test for a constant cost driver coefficient over time
- Ramsey RESET test for model misspecification
- Jarque-Bera test for normality
- Standardised residuals test for outliers.

1.18. These tests including the respective hypotheses tested are briefly discussed below.

White test

1.19. When an OLS regression is run it produces estimates of the standard errors for each of the coefficients in the model. These standard errors are a measure of the uncertainty surrounding the estimates produced. These estimated standard errors can be used to perform hypothesis tests on the coefficients from the model. However, these standard errors will be biased and the results of any hypothesis tests will be misleading if there is:

- Serial correlation: this occurs when the residuals from the regression are not random over time. For example, a positive residual in one period might typically be followed by another positive residual in the next period.
- Heteroscedasticity: this typically occurs when the variation in the residuals is either different over time Or across firms For example, if the residuals were very large in magnitude in some periods compared to others then we might think that the spread of residuals was not constant which would be an indication of heteroscedasticity. We have used the White test to check whether the variation in residuals is constant.

1.20. We test for heteroscedasticity because any violation of this might be an indicator of a more general model misspecification. The White test examines whether the residual variance of the variable in the regression model is constant (homoscedasticity). If there is evidence of variation in the residual variance (heteroscedasticity) it implies that the standard errors of the coefficients (and therefore any hypothesis testing) are biased.

F-test for a constant cost driver coefficient (slope)

1.21. The F-test is used to determine whether the slope coefficients for the different years are statistically similar or different. If they are similar, then the data can be pooled over the given years because it has similar characteristics. If they are statistically different then there is no justification for pooling the data.

Ramsey RESET test

1.22. The Ramsey Regression Equation Specification Error Test (RESET) is a general test for model misspecification. The test is particularly useful to test for functional form misspecification – namely whether some or all of the variables (ie the costs and the driver) should be transformed to logs, powers, reciprocals, or in some other way.

Jarque-Bera test

1.23. The Jarque-Bera test is used to test whether the residuals are consistent with a normal distribution. Normality of residuals is not a necessity, but it is an indication of a well behaved model.

Standardised residuals test

1.24. The standardised residuals test is used to test for outliers. An outlier is an observation that is different to the others in a dataset and has influence over the entire dataset's characteristics. In terms of regression analysis, variation in the data is necessary to carry out estimation. However, outliers can have a disproportionate impact (influence or leverage) on the sign, size and statistical significance of estimated coefficients. Therefore, outliers can make models perform worse in terms of overall fit and standard errors. In efficiency analysis, outliers may skew the efficiency score in such a way that leads to a wrong and potentially unachievable industry frontier.

1.25. Ofgem plans to use outlier analysis as a basis for investigating the data further, as opposed to automatically excluding a given observation.

1.26. We are concerned about data being misreported or being derived from different allocation methods, which make costs/drivers non-comparable. In addition, because Ofgem's comparative analysis is undertaken in order to set an efficient level of expenditure, an extreme observation will significantly influence the outcome of the price level set when it skews the efficiency scores on which the analysis is based. Therefore, there is justification on these grounds to identify outliers and devise means of handling them.