Scottish and Southern Energy Power Distribution

Technical Appendix 09.1

Be efficient

This Technical Appendix is part of the RIIO-ED1 Business Plan of Southern Electric Power Distribution plc ("SEPD") and Scottish Hydro Electric Power Distribution plc ("SHEPD"), together Scottish and Southern Energy Power Distribution ("SSEPD").

A map of the full Business Plan can be found at www.yourfutureenergynetwork.co.uk

Summary

In their cost assessment of Fast Track business plans Ofgem published where they considered DNO groups lay in relation to the efficiency frontier. In this process SSEPD was clearly identified as lying second out of 6 distribution network groups. The gap between the SSEPD group and the upper quartile was calculated to be 3.8%[1].

We believe our plan represented benchmark efficiency across a wide range of activities and delivered real value for money to our customers. Therefore we accepted the challenge from Ofgem to justify or eliminate the gap in our March 2014 submission. This paper demonstrates our success in both of these objectives. We have:

- Reduced incentivised Totex by £134m
- Reduced Pass through costs by £91m
- Demonstrated the investment decisions we have made deliver benefits to customers
  - 739 GWh reduction in network losses over ED1
  - 337 tCO_2e reduction in carbon over ED1
  - 191,000 customer interruptions avoided and 37 million fewer customer minutes lost
  - £4m of Totex expenditure avoided

Our significant reductions in customer funded totex are outlined in Core Narrative – Expenditure.

[1] Assessment of the RIIO-ED1 business plans – supplementary annex

Updates to July 2013 plan

In response to Ofgem's initial assessment feedback we have enhanced our efficiency justification. These select areas form Part 1 – 'March 2014 Update' of this technical appendix. These themes represent those where we did not fully explain or evidence our efficiency proposition. We believe the conclusions and supporting evidence now fully justify our proposed costs and volumes for RIIO-ED1. The main themes of this paper are:

- **RPEs**: We have refined our proposals on Real Price Effects. This has replaced our first submission within this paper.
- **Efficient investment**: Building on our network investment strategy, combined with comprehensive Cost Benefit Analysis (CBA), we clearly demonstrate the considerable benefits accruing to our customers during this and subsequent price controls through targeted incremental investment within our RIIO-ED1 business plan. Where we have made decisions to invest we clearly reference where we have justified this action and provide a summary of the costs and benefits.
- **Atypical costs – Totex modelling**: We have justified a minor improvement to Transmission Connection Point Charges (TCPC) assessment under the Totex cost assessment methodology. We have already sought to explain our rational for this to Ofgem, providing the evidence of why the current approach materially distorts the efficiency ratio for two DNO groups.
- **Alternative cost assessment models**: We broadly support the strategy adopted for assessing costs using a range of techniques, Ofgem's Tool Kit approach. Any assessment methodology will not be without issues. However we believe this is best addressed by setting allowances at Upper Quartile levels of efficiency and would encourage Ofgem not to depart from this core principle.

  We have undertaken a proportionate review of the Totex models selected by Ofgem in their initial assessment to consider whether they could be materially improved. We conclude that while selecting different model formats or alternative drivers can change relative efficiency no one model exhibits significantly superior statistical characteristics.

  For the current process we believe it is essential to maintain a degree of stability in the modelling already undertaken in order for companies to effectively explain why their Totex proposals differ from an industry benchmark.

  We have identified a small number of simple and justified alterations to the modelling method adopted for the initial assessment which we would encourage Ofgem to adopt for subsequent iterations.
- **Impact on cost assessment**: Drawing all our themes together we demonstrate how our March 2014 plan achieves demonstrable efficiency throughout RIIO-ED1.

Our previous sections on Comparative and Absolute efficiency, Parts 1 and 2 – Technical Appendix 09 – Be Efficient, July 2013, remain a valid reference point when considering our overall plan. For this reason they have been included as an appendix in this paper. Where appropriate, reference is made to information or conclusions contained in this section.

Contents

Introduction

R = I + I + O – delivering value for money

The RIIO-ED1 price control period presents a number of challenges to all UK electricity distribution companies. First and foremost is providing a safe and reliable energy service at a stable and efficient price. In addition, as responsible organisations operating within the communities which we serve, we seek to reduce our impact on the environment, provide excellent customer service and discharge our obligations to a wider stakeholder group.

Realising these objectives entails targeted ongoing investment in and maintenance of our extensive network infrastructure, delivered by a highly skilled and effective workforce. Our plan includes papers explaining the work we believe is required to ensure Reliability of the network and meet our Connections obligations. These, and the other papers outlining our Outputs and volumes, seek to justify the need for expenditure and that we have endeavoured to optimise our investment decisions where possible. They define the Outputs which we have committed to deliver for our customers during the ED1 period.

Our paper on expenditure draws together the expenditure we believe is required to allow us to deliver our Output targets effectively. In our March 2014 Expenditure update we have included further information on how our costs have been derived and where further cost detail can be found within the plan.

This paper seeks to justify the level of costs forecast as a result of the workload we have planned. It is intended to clearly demonstrate the inherent efficiency within our plan proposals. Combined with a comprehensive needs case they represent a well justified and value adding business plan for the coming eight years to 2023.

The following sections summarise various aspects of the efficiency assessment of our forecast costs. They consolidate information from a range of sources, within and outwith our plan. These represent the updated analysis in addition to our July 2013 plan. We have included the first submission as an appendix to this paper and reference the relevant conclusions it reached where applicable.

March 2014 Update

In the first part of this paper we discus the key areas where we have enhanced our plan between July 2013 and March 2014. This paper draws together work from across our plan and numerous references and links to other documents are made. We would encourage our stakeholders to reference these sources in conjunction with this paper.

We believe the themes discussed in the following sections are consistent with our original plan and, in most, represent an expansion of the justification and evidence supporting our proposals for RIIO-ED1. For this reason we have also included parts 1 and 2 from our July 2013 plan in an appendix to this paper. This enables the reader to easily reference the conclusions reached.

Following an independent review of the latest forecast price indices for the UK and the methodology of assessing future price pressures we have amended some of our Real Price Effects (RPEs) assumptions. We have replaced our RPE section in its entirety in this version of our Technical Appendix 09.1 – Efficiency. In the July 2013 submission this formed Part 3 of the document.

Our March 2014 submission remains consistent with our original conclusions from July 2013. The key points are:

- **Track record:** SSEPD has consistently been shown to be the frontier DNO and the Upper Quartile DNO group over a number of price control periods
- **Ongoing efficiency:** We remain committed to continue improvements in efficiency, passing on the benefits to customers through prices
- **Innovation:** Our commitment to Innovation is demonstrable through our active participation during DPCR5 – this continues to form a foundation of our proposals for RIIO-ED1
- **Tool Kit Assessment:** Relative efficiency across DNO groups is heavily influenced by the differences in company specific factors and approach to modelling efficiency. Our task is to provide clarity on how to identify and interpret that efficiency.

In response to stakeholder feedback following our July 2013 submission we have focused on the following key areas. Our intention is to elucidate our efficiency argument and ultimately justify the proposals we have made.

Figure 1. March 2014 submission updates

Theme	Key conclusions of Efficiency Technical Appendix
Fast Track: Initial Assessment	Initial Assessment unexplained efficiency gap – 2.4%
Closing the Gap	Quantify considerable benefits embedded within existing proposals Consistent with DPCR5 success – solid track record Delivering above industry average benefits
Totex: Modelling atypical costs	Current modelling of TCPC distorts output Simple amendment to methodology required to remove distortion
Alternative cost assessment models	Range of alternative regression model drivers – no material improvement Limited proposed amendments to activity-level assessment methodology
Real Price Effects (RPEs)	Updated for current indices, forecast revised
Business Support assessment	Believe that in the absence of significantly more robust assessment methodology industry should not change at this time
Impact on cost assessment	SSEPD March 2014 business plan proposals represent above Upper Quartile efficiency

By providing an explanation of our approach to selecting investments we demonstrate that our proposals made in July 2013 were driven by customer value optimisation. Based on this and referring to our comprehensive Cost Benefits Analysis catalogue we quantify the additional outputs embedded within our plan, the value to customers and the incremental investment required to achieve this.

Our assertion is that the improvements to the Cost Assessment Tool Kit are the next logical step in developing modelling and are limited in effect to a material issue for only two DNO groups. Hence we would expect these to be incorporated in the next RIIO-ED1 assessment.

Combined with the considerable totex reductions outlined in this plan we believe SSEPD is well within Ofgem’s determination of upper quartile and our ED1 proposals represent considerable value for money to our customers.

Fast track: Initial Assessment

Ofgem assessment

Key points

Ofgem published their Assessment of RIIO-ED1 business plans in November 2013. This review highlighted some areas which merited further explanation or revision by network companies during the second submission process. As part of this release they also published their view of relative company efficiency. The output of initial cost assessment placed SSEPD 3.8% above the upper quartile benchmark, a difference of £17m per annum for the group, allowing for a 30bps cost of equity downside sensitivity. Excluding the equity sensitivity, underlying Totex proposals were assessed with a gap to upper quartile of £11m per annum, 2.4%.

The supplementary annex supporting Ofgem's assessment also outlines how network companies have been evaluated in relation to the Fast Track assessment criteria.

- Has the DNO followed a robust process?
- Does the plan deliver the required outputs?
- **Are the costs to deliver the outputs efficient?**
- Are the proposed financing arrangements efficient?
- How well does the plan deal with uncertainty and risk?

In relation to the cost efficiency criteria Ofgem have a number of concerns which were expanded upon at subsequent bilateral sessions. The following table summarises the assessment of each primary area of expenditure within the plan.

Figure 2. November 2013 Business Plan cost assessment summary

Activity	Ofgem Assessment	Update – March 2014 Business Plan
Network operating costs (NOCs)	*'Appropriately justified... remain efficient'*	*No material change*
Closely associated indirects (CAIs)	*'higher than current levels.... satisfactory when benchmarked'*	*No material change*
Asset replacement / non load-related expenditure	*'volumes are generally in line with our benchmark... unit costs... generally above our benchmarks'; 'quality of CBAs is poor'*	*Benefits analysis* *Comprehensive CBA catalogue* *Clear link to Health and Criticality* *Innovation driven savings*
Load-related expenditure	*'benchmarks poorly on unit costs... [SEPD]... relatively poorly on forecast workloads'; 'strategy... well articulated'*	*Benefits analysis* *Comprehensive CBA catalogue* *Comprehensive scheme papers* *Innovation driven savings*
Business Support	*'SSEPD benchmarks reasonably well'*	*No material change*
Ongoing efficiencies	*'ongoing efficiency are the most ambitious of all DNOs'*	*No material change*
Real price effects	*'we question the validity of the choice of cost indices and time periods used...'*	*Review of latest RPE forecasts – First Economics consultants report*
Innovation / Smart Grids	*'does not provide a clear picture of the cost savings for RIIO-ED1..'; 'not clear what benefits of this have been embedded into SSEPD's RIIO-ED1 plan'*	*Enhanced strategy, demonstrates Innovation and Smart Grid potential* *Specific cost savings identified*
Smart metering	*'Reasonably well developed,... total IT and DCC costs of £81.7m are not well justified...'*	*Revised expenditure and delivery strategy* *Expanded benefits case for discretionary expenditure (CBAs)*

The Tool Kit approach adopted for the initial assessment process gave greater emphasis to the relative efficiency assessment under the disaggregated or bottom up modelling methodology, 75% of the total efficiency ratio. The remaining 25% was weighted to two Totex regression models based on either Macro economic variables such as customer numbers or units distributed or activity-level variables such as MEAV and Faults.

These methodologies follow similar and consistent approaches to determining an industry and from this the modelled efficient costs for each network company as outlined in Ofgem's strategy decision. The individual steps are:

Figure 3. Costs Assessment process (simplified)

Proposed Totex: Network Business Plan

↓ Deduct RPEs for separate evaluation

↓ Deduct atypical or exceptional factors

↓ Adjust +/- for company specific factors – eliminate inter DNO variance outwith their control

↓ Model normalised costs (regression, median, qualitative or quantitative)

↓ Set industry benchmark costs

↓ Reverse 'efficient' level of company specific factors, atypical or exceptional costs

↓ Add benchmark RPEs to efficient base costs

↓ **Assessed Totex:** Output – benchmark, efficient expenditure

Efficiency ratio: Proposed Totex / Assessed Totex

In our July 2013 business plan we outlined a number of company specific factors which have been part of our Totex expenditure levels in DPCR5, are outwith our control and which will endure through ED1. These are principally in our SHEPD network and were broadly accepted by Ofgem. Further more, there was recognition that the higher labour costs experienced in and around London impact a DNO's ability to control its cost base. An appropriate adjustment was made to a proportion of our SEPD cost base to reflect this.

These normalisations removed a significant potential for the comparison of proposed and assessed totex to be distorted by unavoidable costs resulting from the location of our networks. We welcomed Ofgem's recognition that these factors continue to impact our cost base and believe it is essential that they continue to be incorporated in the next stages of cost assessment.

The remaining gap therefore represents either:

- Costs or volumes which differ from the industry baseline
- Inefficiency
- Residual variances from model imperfections

In our next section we show how our decisions on asset investment, outlined in our July 2013 plan and continued within our March 2014 submission, translate into incremental differences in volumes or costs relative to the industry baseline. This we refer to as, 'Closing the gap'.

Closing the Gap

Initial Assessment

Quantifying the gap

In the previous section we noted that from their initial cost assessment Ofgem's concluded that our first business plan, July 2013, represent 2.4%, £11m per annum, higher expenditure than the industry benchmark. The remaining gap represents differing assumptions on the appropriate level of equity allowance within the ED1 price control.

This is an average annual figure, including RPEs. As we described within the preceding section this is also the weighted average of three different assessments from the Tool Kit of econometric models. It is therefore not possible, nor appropriate, to address each and every difference from 'proposed' to 'assessed' costs.

Interaction with Totex

We have clearly set out within our Core Narrative – Expenditure the significant reduction in costs we are now committed to. These cover our asset investment programme as well as revised RPE effects and the demonstration of innovative solutions to delivering Outputs. In total our Totex proposals have reduced £17m on average per annum from our initial plan.

This in absolute terms would eliminate any perceived efficiency gap identified from the cost assessment process. We believe that this would not provide a complete and comprehensive picture of the value inherent in our ED1 plan. Our remaining Totex proposals represent customer benefits considerably greater than the industry baseline. This value is a crucial element of our continue claim to be a frontier DNO and an upper quartile group.

In our conclusions to this paper we demonstrate how through a combination of benchmark totex, enhanced customer benefits, minimal RPE forecasts and ambitious ongoing efficiency targets we can justifiably make this claim.

Explaining our investment decisions

Source of justification

In this paper we consolidate the evidence and conclusions from a number of documents within our plan. The primary sources are shown in the following table.

Figure 4. Source of justification within Business Plan

Output papers	Core Narrative - Reliability outputs Core Narrative - Reliability Secondary Deliverables Core Narrative - Environment outputs Core Narrative - Expenditure
Programme / Supporting papers	Smart Metering Strategy First Economics - RPE's Confidential justification papers as applicable
Cost Benefit Analysis	Confidential Cost Benefit Analysis Annex and subsequent reference to individual CBA models
Scheme papers	Individual schemes as referenced from Justification Papers and CBA annex

Which gaps to justify?

We have adopted a proportionate approach to enhanced justification within our March 2014 business plan for two reasons. Firstly, the RIIO strategy is based on assessment relative to the level of costs in question. This has informed the focus on particular activities within this plan. Secondly, our justification should not be a reactive process to each and every assessment different but rather driven from the investment decisions we have made in conjunction with our stakeholders.

As we noted in the preceding section any assessment will be subject to varying levels of accuracy. This 'model' noise produces variances, above or below the benchmark. It is important that the methodology and specification adopted minimises the natural modelling residual errors, leaving what should only be unexplained efficiency gaps. For this reason later in this paper we suggest some targeted improvements to the Totex assessment methodology to remove material distortions of the output. Subject to these changes we have therefore not attempted to explain away each and every negative variance but rather accept that in the round the remaining modelling distortions should not skew the over all assessment conclusions.

Feedback from our initial business plan suggested that we mentioned many benefits customers would continue to experience without demonstrating how these would be achieved. In particular our comments on significant existing environmental losses improvements, carbon reduction and provision of capacity were highlighted. Our ED1 forecast volumes and costs are derived from current practice. Therefore, where we make value choices at present these will continue into ED1 and would have an impact on relative efficiency.

In enhancing our March 2014 plan we recognise that we need to state when, where and by how much customers will experience the benefits we create. On reflection in our July 2013 plan we mentioned in a numbers of areas that we already invest in value-adding activities with great success. Two examples are highlighted below.

Environmental Losses

> *'Our existing strategy is to replace existing capacity and create new capacity using low loss equipment and optimal network configuration (where safe and economically efficient to do so), and this remains very effective.'*

Core Narrative - Environment outputs pp. 38

Consac cable replacement

> *'Through effective risk management SEPD has recognised the need to remove this cable from the network and has invested money to remove the potential safety risk.'*

Core Narrative – Expenditure pp. 23

> *'Sections of the network which are subject to repeated faults are investigated and either managed or replaced to minimise interruption durations and the number of customer affected by each fault.'*

Low Voltage Cable Overlay Supporting Paper pp. 12

We recognise where we have not quantified the cost and benefits of these current actions sufficiently before proceeding to describe what additional investment we were considering during ED1. In light of the method of assessing industry benchmark costs and volumes we recognise the necessity of completing this work. This has informed the areas where we are seeking to further justify our investment decisions.

Our revised benefits case therefore rest on two main themes:

a) Demonstrate where our current (DPCR5) investment decisions produce net customer benefits and the impact on costs, volumes and outputs (*e.g. capitalised losses procurement*)
b) Demonstrate where we have selected a different investment proposal from DPCR5 or the industry benchmark (*e.g. Worst Served Customers)*

Benefits based decision process

At the core of our efficiency justification is the demonstration that the choices we make in operating and investing in our networks represent the optimal outcome for our customers. In most instances we achieve this through the application of sensitivity driven cost benefit analysis (CBA) to inform the selection of an optimal solution. In essence this is the **R = I + I + O** equation applied to network behaviour.

This incorporates the following elements:

- **Options**: Identification of realistic solutions (engineering and non-engineering)
- **Innovation**: Consideration of potential alterative options through current and future innovation
- **Benefits**: Collation and monetisation of all relevant and variable benefits (Totex and Societal)
- **Costs**: Realistic evaluation of current and future costs implied by each solution considered
- **Value**: Combining the effects of costs and benefits for each option and valuing outcome in current real monetary terms (Net Present Value – NPV)

This is in essence the application of CBA across all discretionary expenditure choices. Importantly it is a consideration of optimal value for customers driven from and by the need to respond to network issues, primary the delivery of outputs.

Within our accompanying CBA annex we have detailed our approach to value decisions, the **assumptions** made, **sensitivities** considered and the **decision process** we have followed in arriving at our proposed solutions. We would encourage stakeholders to refer to this work as it clearly demonstrates that the consequences of these decisions, variations in costs or volumes summarised in this paper, are fully justified.

Based on this it is logical and necessary to reflect the incremental impact within the cost assessment modelling. The mechanics of this are outlined in the Impact on cost assessment section of this paper.

Making our investment decisions

We have described the tools we have used through out our plan development ensuring we focus on value rather than purely costs. However we do not mechanistically adopt the solution with the highest NPV. Our approach recognises CBA techniques are at most as best as the available information and the ability to identify and monetise all costs and benefits. In arriving at our final decisions we have incorporate the following important factors. These are recognised and discussed in the respective Output and Justification papers within this business plan. In summary they are:

- Deliverability: is the solution with the highest NPV achievable, does it place at risk any other outputs which are of greater importance?
- Sensitivity and risk: we have attempted to incorporate an appropriate range of sensitivity based outcomes within our analysis. However this will never be comprehensive and during the decision process recognition must be given to risks, particularly where their impact is difficult to monetise. This is crucial for safety and reliability factors.

- Future Options: Innovation is becoming an increasingly important factor in network investment decisions. However, by its nature we do not know at this point in time the full potential which may develop during ED1. Therefore, to sometimes select a lower NPV now to preserve the option of adopting a future solution as yet unknown, but anticipated, is a rational behaviour.

Examples of how these factors have influenced our plan are as follows.

- Deliverability: this is particularly important in the area of IT improvements. We have amended our requested allowances for Smart Metering and IT replacement to reflect that such ambitious programmes will need to be delivered over more than one price control period.
- Sensitivity and risk: this is clearly demonstrated in our investment decisions between refurbishment and replacement. Asset Replacement decisions of key primary network plant and equipment, such as EHV and 132kV transformers, have been influenced by sensitivities considering whether a refurbishment programme will deliver the projected life extension. Coupled with the current assessed Health and Criticality of the asset we alter our decision to replace or refurbish.
- Future Options: historic and current levels of network failure on selected areas of LV Consac indicate that in the short term much of this asset may reach unacceptable levels of reliability. We have proposed a programme of works, aligned with DPCR5 levels and in conjunction with innovative techniques to manage the impact on customer interruptions and safety. We could make an argument for the systematic replacement of our entire asset portfolio at annual volumes 4 times the proposed level. However we recognise that retaining options for the development of further innovative solutions or the impact of smart grids is the prudent approach at this time given the experience in innovation development over the current price control.

Quantifying our investment decisions

In the preceding sections we have identified the need to justify perceived efficiency gaps in our initial business plan; our method of identifying the relevant activities and how we have approached RIIO based investment decisions.

As noted already within this paper the volume of information and analysis supporting our proposals exceeds what can be incorporated into this Technical Appendix. What follows therefore is a summary of the incremental costs and volume movements and associated output benefits which form the basis of our plan proposals. Links to the source documents are included below.

To assist we have organised the summary by the primary driver and the impact within our plan.

Figure 5. Outputs and associated costs of benefits analysis RIIO-ED1

SEPD		**Benefits** (total ED1)				**Investment Required (£m ED1)**
Activity		Totex (£m)	Losses (GWh)	Carbon (tCOe)	CI/CMLs	
Asset Replacement						
	132kV network	-	23.7	10.7	-	4.6
	EHV network	-	115.2	52.1		11.3
	HV network	-	132.1	60.2	-	1.3
	LV network	3.5	-	-	122k / 26m	48.0
Reinforcement						
	132kV network	-	10.5	4.9	-	1.8
	EHV network	-	173.2	79.8	-	6.7
	HV network	-	120.7	55.0	-	0.4

SHEPD		**Benefits** (total ED1)				**Investment Required (£m ED1)**
Activity		Totex (£m)	Losses (GWh)	Carbon (tCOe)	CI/CMLs	
Asset Replacement						
	132kV network	-	-	-	-	-
	EHV network	-	66.4	30.2	17.9k / 3m	6.2
	HV network	-	49.4	22.5	-	2.6
	LV network	-	-	-	-	-
Reinforcement						
	132kV network	-	-	-	-	-
	EHV network	-	39.9	18.3	-	5.3
	HV network	-	8.0	3.6	-	0.03

	Benefits (total ED1)				**Investment Required (£m ED1)**
	Totex (£m)	Losses (GWh)	Carbon (tCOe)	CI/CMLs	
Worst Served Customers	0.3	-	-	50.8k / 8m	25.0

The comprehensive breakdown of these benefits is contained within our confidential supporting paper: Cost benefits analysis Annex and accompanying spreadsheet: Benefits summary file.xlsx. Where the output of our benefits analysis have influenced our investment proposals for ED1 the summary of the benefits delivered and the additional costs incurred are summarised in each relevant justification paper.

We believe the benefits summarised above more than justify the incremental costs we have identified. As such we would expect this cost difference to be excluded from Ofgem's subsequent cost assessment process and assessed separately. The adjustments necessary to reflect

In our updated Innovation paper we also identify where we have applied innovative solutions and techniques and believe we can avoid or defer investment in asset replacement or reinforcement. We have included a summary of these decisions along side the benefits driven analysis. This is to enable Ofgem sufficient clarity to normalise its cost assessment modelling if it believes this is required.

In our plan we have embedded specific and general aspirations for innovation driven efficiency improvements. We believe this post efficiency level of totex is the appropriate level at which to compare and contrast inter-DNO efficiency. To do otherwise would entail reversal of each networks efficiency proposals, assessment then application of a general, industry target.

Atypical Costs – Totex Modelling

> *'We consider that totex benchmarking is an important tool for the assessment of relative efficiency. Totex benchmarking offers two main advantages over more disaggregated approaches; (i) it captures cross-activity trade-offs relatively well, and (ii) it is not affected by cost categorisation issues.'*

Strategy decisions for the RIIO-ED1 electricity distribution price control – Tools for cost assessment, 2.26.

In their initial assessment of ED1 costs efficiency Ofgem have employed three models; a disaggregated activity-level based model and two top-down Totex regression models. By combining the attributes of each approach to assessing cost efficiency it is possible to increase the overall quality of the network allowance determination. However, the value of each methodology is dependent on adhering to principles on which it is developed.

This section demonstrates that the inclusion of Transmission Connection Point Charges (TCPC) in the top-down Totex regression modelling leads to a distortion of the efficiency ratio produced and ultimately the weighted efficient level of Totex.

In discussions with Ofgem post initial assessment we have outlined this rational and provided a summary of our justification for the change. Much of this material is restated here.

Totex Models – Initial assessment

Model form

Ofgem have employed two top-down Totex models in the cost assessment process; one using activity-based drivers and one based on high-level indicators such as unit distributed and customer numbers. The same adjustments have been made to DNO submitted costs prior to assessment across both models. These include recognition of company specific factors.

Using a common form of the cost function, Log (Y) = C + β * (Log(X) + ε, and the three years actual expenditure for 2011-2013 Ofgem have derived a benchmark log-linear relationship between the cost drivers, explanatory variable, and the efficient forecast costs, dependant variable. This is set at the upper quartile level of efficiency, in effect between the 4^{th} and 5^{th} network as ranked by efficiency.

Application of model

Having derived an upper quartile function for totex in each model Ofgem roll forward costs for ED1 using their determination of the forecast cost drivers up to 2023. Therefore the modelled costs will reflect the composition of the cost base used to derive the regression function and the sensitivity of the cost driver to changes in required costs year on year or between network companies.

In the papers, 'Strategy decisions for the RIIO-ED1 electricity distribution price control – Tools for cost assessment' and 'RIIO-ED1 business plan expenditure assessment – methodology and results', Ofgem recognised that two factors could negatively impact the validity of the regression model output.

- Where costs were not part of the model base data
- Selected cost drivers do not represent anticipated changes in expenditure levels

> *'A key reason for making such adjustments prior to the benchmarking (outside the econometric models) is the nature of the data… Our adjustments fall into the following categories... exclusion of costs that are inappropriate for comparative benchmarking because they are only incurred for a small number of DNOs.*
>
> *However, there are some weaknesses with a totex approach in that it is only possible to use a small number of factors to explain costs, and therefore it may have a less rich specification than more disaggregated analysis.'*

Strategy decisions for the RIIO-ED1 electricity distribution price control – Tools for cost assessment, 2.26.

Prior to the start of ED1 TCPC costs are treated as pass through and therefore outwith the base costs used for totex regression modelling. At the start of ED1 all new TCPC connections will be funded through an ex-ante allowance. Further more, the spread of TCPC costs incurred across DNOs during DPCR5 is distinctly different to that anticipated under ED1. This pattern does not endure into ED1. No cost driver proposed or selected can replicate this change in cost classification between price control periods or the concentration of costs within a limited number of DNOs.

We have identified to Ofgem that the inclusion of TCPC forecast costs for ED1 under the Totex regression modelling creates a distortion of the efficiency results for the reasons noted above and would expect necessary adjustments to be made prior to regression modelling.

Effect of Totex model on Initial Assessment

Only two DNO groups have forecast material levels of TCPC costs for RIIO-ED1. These are UPKN and ourselves, SSEPD. Within these groups the impact is concentrated on two DNOs, LPN and SHEPD. The forecast expenditure within the respective July 2013 business plans were £41m, UKPN, and £76m, SHEPD, excluding RPEs. These forecasts represent over 70% of the total industry proposals for ED1. For SHEPD this represents 6.4% of its total ED1 totex forecast, a significant and material element.

This concentration of costs is driven by network specific factors. For our Hydro network this is entirely due to the huge increase in connection of Distributed Generation (DG) in the remote areas of Scotland. Here there is minimal local base load to absorb the output of DG and therefore the only solution available is through a connection to the transmission system.

Under the methodology adopted for the initial assessment process TCPC costs are excluded from the regression base costs. Therefore the coefficient of the resulting linear function representing the upper quartile level of efficiency does not include any element of TCPC costs as part of total expenditure, totex. Similarly the cost drivers used to explain the relative movements in totex such as customer numbers; units distributed; fault numbers or Modern Equivalent Asset Value (MEAV) do not adjust between price controls to reflect the movement of costs into controllable totex or the concentration of costs within two DNOs through ED1.

We have included an illustration of this effect within Appendix A – Totex Modelling of this paper, 'Current Approach'. This is a simple representation of the effects discussed above. It is not based on actual data and is constrained to only 5 DNOs to enable it to be represented on a single page. A summary of the impact is shown in

Options considered

In our summary provided to Ofgem we identified that there are two possible approaches to this issue:

1. Include a level of TCPC costs into the base expenditure of DPCR5 totex, derive an efficient linear function and roll forward into ED1 using forecast cost drivers. (Opt 1)
2. Derive efficient linear function from base DPCR5 totex, excluding TCPC, normalise TCPC from ED1 forecast, roll forward base efficient totex using forecast cost drivers, add back determined efficient level of forecast TCPC. (Opt 2)

Option 1: As shown in our illustration in Appendix A – Totex Modelling the effect of option 1 is to incorporate a proportion of DPCR5 pass through TCPC costs into efficient totex and roll this forward into ED1, even for those DNOs who have not identified a forecast cost. While the negative impact on the atypical DNOs is reduced (DNO C and E) the consequential increase in efficient costs for the remaining three DNOs does not seem to be aligned with the ED1 cost assessment strategy. UK Customers in this instance will pay more than required or requested.

Recommended Option

Option 2: Our illustration builds on the logic outlined in Ofgem's strategy documents and their initial assessment report. Exceptional or atypical costs which are *'inappropriate for comparative benchmarking because they are only incurred for a small number of DNOs'* should be excluded and assessed independently of the regression modelling. These forecast TCPC should still be exposed to an assessment of efficiency and need through qualitative processes. The determined efficient level of ED1 TCPC should be reinstated in the post modelled totex and influence the setting of allowances and IQI.

In this option DNOs not requesting TCPC costs are not impacted, customers will not pay in excess of forecast totex and the atypical DNOs are assessed in an effective an equitable way.

Figure 6. Illustration of Totex modelling – impact on TCPC allowances

£m	Forecast Totex - inc TCPC			Allowed' Totex - inc TCPC		
	Current assess-ment	Option 1	Option 2	Current assess-ment	Option 1	Option 2
DNO						
A	£240	£240	£240	£240	£250	£240
B	£150	£150	£150	£150	£155	£150
C	£215	£215	£215	£200	£208	£215
D	£260	£260	£260	£260	£271	£260
E	£265	£265	£265	£250	£260	£265
	£1,130	**£1,130**	**£1,130**	**£1,100**	**£1,143**	**£1,130**

Conclusion

To avoid a material distortion of the efficiency of individual DNOs and to avoid increased and unwarranted allowances we believe Ofgem should assess TCPC forecast costs separate from their regression models. We will activity support the ongoing review of the need for and efficiency of TCPC costs as Ofgem develop their initial proposals for ED1.

Alternative Cost Assessment Models

This short section is a summary of our work to review the effectiveness of the modelling adopted by Ofgem in their initial assessment of ED1 business plans. We are mindful of balancing the accuracy of modelling outputs with a need to stability during a price control assessment process. While as an industry we could devote considerable time and resources to refining the efficiency assessment models for the current price control process this would only seek to distract from the objective of setting appropriate allowances with, we believe, little net gain in terms of accuracy. We recommend making the development of industry standard assessment techniques a target of the initial years of ED1.

We have sought only to recommend changes where we believe the effect on the overall efficiency assessment or the impact on a limited number of DNOs is material. Please see our preceding section on Atypical Costs – Totex Modelling. We recognise the increased level of interest across the industry in the methodology adopted for modelling efficient business support costs. However in the absence of a significantly improved methodology we recommend retention of the current approach with adjustments for well justified DNO specific issues.

Regression models

We have considered both alternative functional forms of regression models and cost drivers as explanatory variables. Our conclusions are outlined below.

Functional forms

Ofgem have consistently adopted a natural log format for its activity based and totex regression models. We see no benefit in moving away from this at this stage. The rational of adjusting for scale economies remains a logical econometric assumption for most if not all activities assessed through regression techniques.

Cost drivers

We have tested whether alternative cost drivers for the activity-based regression models offer a better explanation of cost behaviour across the industry. The models reviewed and the variables considered are as follows:

Figure 7. Alternative regression models considered

Activity Area	Assessment technique – Nov 2013	Alternative considered – March 2014	Model specification
Totex models			
Activity-level	Composite scale variable (CSV) – multiple variables (see appendix)	Remove ONIs; overhead line length; number of faults	No change
Macro	CSV – customers; units distributed; network length	Additional density variable	Reduced
Activity-level model			
Trouble Call	Faults	Include MEAV; density	Small improvement
CAIs – Control Centre	Faults; employees	Include units distributed – scale variable	Small improvement
CAIs – Call Centre	Faults	Include units distributed – scale variable	Small improvement
CAIs – network design	MEAV	Include units distributed; customers	Improved

Proposed Cost Assessment alternative modelling

For the remaining activity based assessment techniques used during the evaluation of fast track business plans we have included a table listing where, we recommended an alternative approach.

Figure 8. Cost assessment techniques – alternative approach

Activity Area	Assessment technique – Nov 2013	Proposed – March 2014
General cost assessment		
Worst Served Customers	Assessed outside Cost Assessment – no impact on IQI	No change – WSC continues to by atypical across DNOs
Totex models		
TCPC	Including TCPC within roll forward Totex modelled allowances. Distorts outcome. See preceding section.	Evaluate TCPC outwith Totex model. Include pre IQI assessment. See preceding section.
Activity-level models		
Reinforcement	Primary network volumes adjusted by ratio of forecast capacity added over increase in demand above firm – substation only	- consider capacity added from all Primary activity over firm demand increase - recognise condition driven capacity

		increase
CV3: Sub Sea Cables	Evaluate HV and EHV asset replacement independently	Group assessment – total km network and weighted average unit cost
Business Support costs	Complex integrated model	Retain current methodology in absence of significantly more robust approach – allow well justified DNO specific adjustments

Worst Served Customers

Within our Reliability Outputs paper and the accompanying supporting paper we have outlined the specific need to address persistent high levels of customer interruptions within our Scottish Hydro network region. We believe that this is a materially different issue to standard network investment and, like issues such as Rail Network electrification, merits evaluation outwith controllable totex and IQI.

TCPC

In the preceding section we have outlined our rational for the assessment of TCPC costs outwith the Totex regression model but remaining part of the over all Totex cost assessment process.

Reinforcement

We recognise that considering the level of capacity added relative to the increase in demand is an essential element of determining whether individual DNO proposals represent proportionate or excessive levels of load driven investment. However we believe that there is merit in considering the over all capacity added relative to increase in firm demand across all Primary network investment.

Treatment of 2 Asset Replacement MVA and revised CV102

Within our reinforcement forecasts we have included two projects which, by virtue of the engineering solution adopted to address a condition driver have created additional capacity. Adhering to industry guidelines we have incorporated these into our load projections for ED1. To assess the need for such interventions on a capacity added relative to increased demand would therefore be a distortion of the methodology and warrants an appropriate adjustment within the activity-level cost assessment modelling.

- North Hyde – 31 MVA
- Leamington Park – 32 MVA

Sub Sea cables

In our Core Narrative - Reliability outputs paper and the supporting confidential justification paper we outline why our proposals for sub sea cable replacement are warranted by the asset age, results of cable surveys and damage coupled with the growing level of faults recorded. We note that while we are considered to be replacing in excess of the modelled lengths of HV cable we are considerably lower in volumes on EHV cable.

We believe that as HV and EHV cable replacement is essentially the same activity at very similar prices these two asset categories merit consideration as one group. Therefore the assessment methodology should reflect total asset volumes proposed versus modelled and a weighted benchmark unit cost.

While in total we have proposed a lower volume of HV and EHV cable at a lower weighted unit cost the current assessment methodology reduces our forecast expenditure by over 20%.

Business Support costs – adjusting for fixed costs

Establishing an equitable benchmark for DNO business support costs is an important component of the over all cost assessment process. There has been considerable industry debate over the correct approach to this for ED1. At the centre of this deliberation are two key points:

- Are network operators subject to fixed costs on a group or individual DNO basis which are not proportional to the scale of the network. Therefore do larger groups exhibit economies of scale.
- Should network operators be allowed such fixed costs on a DNO basis or based upon their group structure. Therefore how should such economies of scale be apportioned between DNO and customer.

We recognise the efforts of various parties across the industry in constructing and proposing alternative modelling solutions.

We too have modelled alternative approaches to first establishing the presence of fixed costs and there after how best to adjust for their effect on the over all benchmarking exercise. Our conclusion is that the issue is based wholly on the appropriateness of sharing economies of scale between customer and DNO. Therefore without a demonstrably superior cost assessment methodology to that employed by Ofgem in their initial assessment we believe the issues of fixed costs is most appropriately addressed through qualitative adjustments based on well justified proposals from individual DNOs.

Conclusions

We remain supporting of the general approach to benchmarking taken by Ofgem in their initial assessment of ED1 business plans. For the second cost assessment stage we believe the simple changes proposed above should be adopted.

Real Price Effects

We expect to continue to achieve annual productivity gains of up to 1% in like-for-like activities, although these gains will be partially offset by real price effects on our business.

This section sets out our views on our ongoing approach and commitment to future productivity improvements over the RIIO-ED1 period. In addition, we consider Real Price Effects and how they are likely to impact on our costs over the period.

Productivity improvements

Productivity improvements are where we get better at a particular activity over time, thereby reducing the cost or time taken to complete the activity. There is a range of ways we can get better and more productive, such as smarter working practices and innovative solutions.

We expect to continue to make year-on-year improvements in productivity during the RIIO-ED1 period. This is the same expectation that we had when we submitted the July 2013 business plan and it remains unchanged for this business plan submission

It is management practice that both of our DNOs are targeted to achieve annual operating cost efficiency gains of between 0.5% and 1.0% on like-for-like activities.

In order to achieve this target we are continually seeking to implement smarter working practices and innovative solutions to drive down our costs. By keeping our focus on these activities, we expect to meet our internal targets across the eight year period. We estimate that each year, our overall productivity will improve by up to 1%. In Ofgem’s assessment of the SSEPD RIIO-ED1 business plans published in November 2013 it was noted that SSEPD ongoing efficiency assumption is the most ambitious of all DNO’s.

The comparative analysis of DNOs is substantially more developed than in other network sectors. There has been full comparative analysis since 1990 and many efficiency gains have been achieved. The scope for efficiency improvement still exists but is reducing, with efficiency gains becoming harder to realise. Therefore, we consider that it is inappropriate to expect efficiency savings of more than 1% per year for electricity DNOs.

Real Price Effects

Real Price Effects (RPE) is a term used to describe increases in costs which are not in line with the traditional rate of inflation calculation. For our business, the Retail Price Index (RPI) is used as a proxy for external cost pressures. RPEs are expected inflationary impacts relative to RPI.

These RPEs impact on items such as labour costs, contractor costs and plant costs. It is recognised by Ofgem and many industry commentators that, whilst the rate of inflation calculation will provide DNOs with some security against rising costs over time, the costs which are subject to RPEs will inflate out of line with the normal inflation forecast. If the effect of RPEs is not considered and accounted for, the DNOs will be unable to recover the actual costs of their business activities.

Our approach to Real Price Effects

In the July 2013 RIIO ED1 Business Plan we used an externally commissioned report by an independent economic consultant, First Economics (FE). We have reviewed the comments made by Ofgem in their assessment of the July business plans and also examined the information on this subject published by the Competition Commission (CC) in its provisional finding on the Northern Ireland Electricity price control inquiry. In preparing this business plan submission we asked First Economics to review their methodology in comparison with others and also take into account the latest available evidence on economic forecasts, market conditions and RPI in assessing the impact of real price effects over the RIIO-ED1 period.

In their updated report FE have used the same methodology they have used in previous reports on this subject. The first step is to estimate the rate of nominal input inflation then deduct the expected rate of RPI inflation. This methodology is consistent with the approach used by the CC in their NIE determination. In addition the FE approach utilises the most recent Office of Budget Responsibility (OBR) economic forecasts which again is consistent with the approach used by the CC. The OBR is specifically tasked by UK government to take a coherent view of the UK's economic prospects and as such has a coordinated view of the country's fiscal policies and economic data and this adds a significant element of credibility to its forecasts. The FE report uses the OBR's December 2013 forecasts for GDP, RPI and wage inflation.

The choice of reference indices applied to the various expenditure types and used by FE in their report is also broadly consistent to those used previously used by Ofgem. In addition the choice of indices is consistent with the CC and the FE report has taken into account additional indices referred to by the CC.

The FE approach applies a premium of 1.25% pa for specialist labour above the level of general labour inflation. It is expected that the demand for specialist skills such as electrical engineers with infrastructure experience will remain high. In particular, step increases in transmission construction, continued high levels of investment in the water sector, a ramp up in Network Rail's expenditure, and a steady stream of other infrastructure projects will create considerable competition for the specialist skills that DNOs need. As a consequence, wage inflation for specialist labour is almost certain to go on outstripping average earnings growth.

We firmly believe that the methodology adopted by FE is robust and strengthened by the fact that it is consistent in its approach to that suggested by the CC. As a result we have used the updated FE report dated 27th January 2014 as the basis of our submission on real price effects within our business plan.

Summary of Real Price Effects included within the SSEPD Business plan

As a result of the updated RPE forecast contained within the FE report the total RPE's included within our March 2014 Business plan submission for the RIIO ED1 period is £80.1M for SEPD and £39.5M for SHEPD, a total of £119.6M for our two DNO's. This compares with a total of £193.6M included with the July business plan submission (SEPD £125.5M and SHEPD £67.1M). This represents a reduction of £74M from the July Business plan.

We note below the main inputs to the assessment of RPE's included with the updated FE report and used within our business plan.

Summary of First Economics RPE report

Figure 9. (a) Input price inflation forecasts by main cost category (%)

	2014/15	2015/16	2016/17	20117/18	2018/19	2019/20 to 2022/23
Labour – general	2.8	3.7	4.3	4.5	4.4	4.25
Labour – specialist	4.1	5.0	5.5	5.7	5.6	5.5
Materials – general/civils	4.5	4.5	4.5	4.5	4.5	4.5
Materials – electrical	5.0	5.0	5.0	5.0	5.0	5.0
Plant and equipment	2.5	3.4	3.6	3.7	3.7	4.25

Figure 10. (b) RPI Forecasts

Year	RPI-measured inflation
2014/15	3.0%
2015/16	3.4%
2016/17	3.6%
2017/18	3.8%
2018/19	4.0%
2019/20 and thereafter	3.4%

Figure 11. (c) RPE estimates by main cost category

	2014/15	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20 to 2022/23**
Labour – general	(0.2)	0.3	0.7	0.7	0.4	0.85
Labour – specialist	1.1	1.6	1.9	1.9	1.6	2.1
Materials – general/civils	1.5	1.1	0.9	0.7	0.5	1.1
Materials – electrical	2.0	1.6	1.4	1.2	1.0	1.6
Plant and equipment	(0.5)	(0.9)	(1.1)	(1.3)	(1.5)	(0.9)

In the March 2014 Business Plan we have used the same weighting and split of costs between the different expenditure categories that we used in the previous business plan submission in July 2013.

In the application of RPE's we have assumed a neutral stance on the Transport and Other expenditure categories These categories have a relatively small percentage of total expenditure associated with them and there is no direct correlation to any specific indices within the FE report. As a result we have assumed that these expenditure categories will move in line with RPI and therefore have no RPE's applied to them.

The most significant reasons for the differences in RPE's between the 2 business plan submissions is due to the higher level of RPI inflation being forecast by the OBR in December 2013 than used in the previous report.

Impact on cost assessment

This paper has demonstrated that our ED1 business plan is grounded on efficient and justified expenditure proposals. The components of such a plan include sound benefits based investment decisions, realistic forecasts of future price pressures and a strong track record in expenditure control.

The effect on the RIIO-ED1 process is to move the SSEPD group into first position in over all network efficiency. We have summarised this process in this concluding section.

Components of an efficient plan

Totex

We have confirmed that between our first plan in July 2013 and this submission we have been able to identify and eliminate over £130m of controllable totex and over £90m of pass through costs.

Ongoing efficiency - innovation

The extensive evidence provided within our March 2014 business plan supporting our strategic approach to innovation and smart grids demonstrates our commitment and ability to deliver ambitious ongoing efficiency assumptions made. We have clearly illustrated through specific projects and reductions in totex how the development of improved asset knowledge and management of our networks will permit ongoing savings.

Outputs – benefits

We have clarified the incremental outputs and societal benefits that were key components of our July submission. This permits effective comparison of the costs and benefits between DNO business plans. Our proposals have been based on targeted improvements in environmental outputs and the mitigation of upward pressures on customer service reliability. The majority of these improvements in outputs continue our performance and trend during DPCR5. We believe our track record in areas such as network losses demonstrate our ability to continue to deliver in ED1.

These benefits come at a cost. We have clearly identified the expenditure required to deliver these within the price control period. Our decision in July 2013 to propose this level of expenditure has now clearly been demonstrated through the comprehensive CBA catalogue accompanying our plan. This analysis clearly shows we have consider alternative options, the impact of risks and sensitivities and the deliverability of our proposals.

Figure 12. Key benefits summary

Activity Area	Benefits (ED1)	Expenditure (ED1 £m)	Supporting justification
Losses reduction[a]			
Asset Replacement	387GWh	26	CBA annex and Environmental Outputs
Reinforcement	352GWh	14	CBA annex and Environmental Outputs
Interruption avoided			
LV Consac	123k CI avoided	48	CBA annex and LV Cable overlay paper
Sub Sea Cable	Prevent network failure	42	Submarine cable Justification Paper
Interruption improved			
Worst Served Customers	c. 50,800 fewer CI by 2023	25	CBA 3-8

a: accompanied by associated carbon reduction

Combined with reduced expenditure the value of these benefits are the largest factors in our movement towards the industry frontier.

Proportional and effective assessment

This paper demonstrates the need to make limited but important improvements to the fast track cost assessment methodology and models. We are broadly supportive of Ofgem's initial assessment methodology and believe that these partial updates will provide a stable platform on which to build. The tool kit approach is effective in balancing the descriptive qualities of each type of econometric model.

We have identified necessary changes to the following areas.

Figure 13. Key cost assessment updates

Activity Area	Proposed – March 2014
Totex models	
CV108: TCPC	Evaluate TCPC outwith Totex model. Include pre IQI assessment.
General cost assessment	
CV106: Worst Served Customers	No change – WSC continues to by atypical across DNOs. Assess outwith non-variant totex and IQI.
Activity-level models	
CV101-104: Reinforcement	- consider capacity added from all Primary activity over firm demand increase - recognise condition driven capacity increase
CV3: Sub Sea Cables	Group assessment (HV – EHV) – total km network and weighted average unit cost
CV36: Business Support costs	Retain current methodology in absence of significantly more robust approach – allow well justified DNO specific adjustments

Updated cost assessment conclusions

Combining the value and impact of the factors discussed in this paper and summarised above our position within Ofgem's initial cost assessment analysis changes considerably.

Our enhanced justification for the investment decisions we have proposed demonstrate the value which was within our July 2013 plan. Our review and update of industry forecasts of factors such as RPEs reduces the over all cost of delivering our original proposals.

We have combined the value justified with the reduction in forecast totex and the limited cost assessment methodology amendments to replicate the initial assessment efficiency ratios published by Ofgem in December 2013. The results are summarised below.

Figure 14. SSEPD – March 2014 summary efficiency

DNO	Submitted totex	UQ Benchmark	Difference	CoE sensitivity	Combined UQ benchmark	Gap to UQ benchmark
SHEPD	1,196	1,205	*9*	*(18)*	*1,188*	*(0.7%)*
SEPD	2,424	2,469	*45*	*(36)*	*2,432*	*0.3%*
SSEPD	***3,620***	***3,674***	***54***	***(54)***	***3,620***	***0.0%***

£m – 2012/13 prices

This clearly shows our Southern network as second and Scotland as third ranked DNOs with a clear gap to the fourth ranked network. On a group basis SSEPD is the leading DNO group.

We consider that this paper, combined with our enhanced plan, comprehensively demonstrates that

- We have closed the 2.4% efficiency gap perceived at initial assessment
- We are delivering considerable ongoing benefits across customer interruptions and losses
- Our proposed costs are justified and appropriately benchmarked

Therefore with a £134m reduction in totex, forecast reductions in customer bills of 15.8% in year 1 and upper quartile efficiency we believe our RIIO-ED1 plan should be allowed in full.

Appendix A – Totex Modelling

Illustration of Transmission Connection Point Charges modelling within Totex Regressions

Current Approach - Initial Assessment, TCPC not in historic totex, TCPC in ED1 forecast totex
Modelled Totex = 50 + 0.0001 * X

DPCR5

Network	Year	Totex (£m) Actual	Contr TCPC (£m) Actual	Total Totex (£m) Actual	Driver X (customers)	Modelled Efficient Totex	Modelled Efficient Totex (post Normalisation)	Implied Eff Gap	UQ Efficient Totex	n.b Pass Through TCPC (£m)	
A	2013	£240	£0	£240	1,900,000	£240	£240	1.00	1.00	£10	
B	2013	£150	£0	£150	1,000,000	£150	£150	1.00	1.00	£5	
C	2013	£200	£0	£200	1,500,000	£200	£200	1.00	1.00	£8	
D	2013	£260	£0	£260	2,100,000	£260	£260	1.00	1.00	£11	
E	2013	£250	£0	£250	2,000,000	£250	£250	1.00	1.00	£10	
									1.00		

ED1

Network	Year	Base Totex (£m) F'cst	ex-ante TCPC (£m) F'cst	Total ex-ante Totex (£m) F'cst	Driver X (customers)	Modelled Efficient Totex	Modelled Efficient Totex (post Normalisation)	Implied Eff Gap	UQ Efficient Totex	Total Totex Allowed	Diff to F'cst (£m)
A	2016	£240	£0	£240	1,900,000	£240	£240	1.00	1.00	£240	0
B	2016	£150	£0	£150	1,000,000	£150	£150	1.00	1.00	£150	0
C	2016	£200	£15	£215	1,500,000	£200	£200	**1.08**	1.00	£200	(15)
D	2016	£260	£0	£260	2,100,000	£260	£260	1.00	1.00	£260	0
E	2016	£250	£15	£265	2,000,000	£250	£250	**1.06**	1.00	£250	(15)
									1.00	**£1,100**	(30)

Opt 1 - Include Pass Through TCPC in modelling:
Modelled Totex = 50 + 0.000105 * X

DPCR5

Network	Year	Totex (£m) Actual	P-Through TCPC (£m) Actual	Total Totex (£m) Actual	Driver X (customers)	Modelled Efficient Totex	Modelled Efficient Totex (post Normalisation)	Implied Eff Gap	UQ Efficient Totex	n.b Pass Through TCPC (£m)	
A	2013	£240	£10	£250	1,900,000	£250	£250	1.00	1.00	£10	
B	2013	£150	£5	£155	1,000,000	£155	£155	1.00	1.00	£5	
C	2013	£200	£8	£208	1,500,000	£208	£208	1.00	1.00	£8	
D	2013	£260	£11	£271	2,100,000	£271	£271	1.00	1.00	£11	
E	2013	£250	£10	£260	2,000,000	£260	£260	1.00	1.00	£10	
									1.00		

ED1

Network	Year	Base Totex (£m) F'cst	ex-ante TCPC (£m) F'cst	Total ex-ante Totex (£m) F'cst	Driver X (customers)	Modelled Efficient Totex	Modelled Efficient Totex (post Normalisation)	Implied Eff Gap	UQ Efficient Totex	Total Totex Allowed	Diff to F'cst (£m)
A	2016	£240	£0	£240	1,900,000	£250	£250	0.96	1.00	£250	10
B	2016	£150	£0	£150	1,000,000	£155	£155	0.97	1.00	£155	5
C	2016	£200	£15	£215	1,500,000	£208	£208	**1.04**	1.00	£208	(8)
D	2016	£260	£0	£260	2,100,000	£271	£271	0.96	1.00	£271	11
E	2016	£250	£15	£265	2,000,000	£260	£260	**1.02**	1.00	£260	(5)
									1.00	**£1,143**	**13**

Opt 2 - Recommended exclude from totex regression modelling, determine efficient ED1 forecast and 'add back'
Modelled Totex = 50 + 0.0001 * X

DPCR5

Network	Year	Base Totex (£m)	pass through TCPC (£m)	Total ex-ante Totex (£m)	Driver X (customers)	Modelled Efficient Totex	Modelled Efficient Totex (post Normalisation)	Implied Eff Gap	UQ Efficient Totex	n.b Pass Through TCPC (£m)	
A	2013	£240	£0	£240	1,900,000	£240	£240	1.00	1.00	£10	
B	2013	£150	£0	£150	1,000,000	£150	£150	1.00	1.00	£5	
C	2013	£200	£0	£200	1,500,000	£200	£200	1.00	1.00	£8	
D	2013	£260	£0	£260	2,100,000	£260	£260	1.00	1.00	£11	
E	2013	£250	£0	£250	2,000,000	£250	£250	1.00	1.00	£10	
									1.00		

ED1

Network	Year	Base Totex (£m) F'cst	ex-ante TCPC (£m) F'cst (normalised pre-regression)	Total ex-ante Totex (£m) F'cst	Driver X (customers)	Modelled Efficient Totex (exc TCPC)	Modelled Efficient Totex (post Normalisation)	Implied Eff Gap	UQ Efficient Totex	Total Totex Allowed	Diff to F'cst (£m)
A	2016	£240	£0	£240	1,900,000	£240	£240	1.00	1.00	£240	0
B	2016	£150	£0	£150	1,000,000	£150	£150	1.00	1.00	£150	0
C	2016	£200	£15	£215	1,500,000	£200	£215	**1.00**	1.00	£215	**0**
D	2016	£260	£0	£260	2,100,000	£260	£260	1.00	1.00	£260	0
E	2016	£250	£15	£265	2,000,000	£250	£265	**1.00**	1.00	£265	**0**
									1.00	**£1,130**	**0**

Appendix B – Alternative Regression Models

Cost Assessment Regression Review

Background

As part of the RIIO-ED1 price control process, DNOs are benchmarked against other distribution companies. Benchmarking occurs in the form of Ofgem's Cost Assessment Models. These models assess a company's efficiency and Total Expenditure against each other through both statistical and non-statistical methods. This paper discusses SSEPD's works towards testing any improvements to Ofgem's statistical models. These statistical Models can be divided into:

- Totex Macro
- Totex Bottom-Up
- Disaggregated

SSEPD's objectives during these works were:

- To provide an opinion on Ofgem's statistical models and methods
- To test alternate drivers and combinations

Approach

Our Approach towards proposing any changes to Ofgem's statistical models were based on an assessment of economic relationships, model simplicity and availability of data. The table below provides a list of Ofgem's models, with their specific drivers:

Figure 15. Ofgem Initial Cost Assessment Regression Model form

Cost area	Regression Number	Regression Equation
Totex	1	ln(Totex) = a + b1*ln(BU_CSV)
	2	ln(Totex) = a + b1*ln(macro_csv)
Tree Cutting	3	ln(Tree cutting) = a + b1*ln(Spans Cut)
Trouble call (Faults)	4	ln(Trouble call costs LV/HV OHL) = a + b1*ln(Fault vol LV/HV OHL)
	5	ln(Trouble call costs LV plant) = a + b1*ln(Fault vol LV plant)
	6	ln(Trouble call costs HV plant) = a + b1*ln(Fault vol HV plant)
ONIs	7	ln(ONIs) = a + b1 * ln(ONIs faults)
Closely Associated Indirects	8	ln(emcs+stores+network policy) = a + b1* ln(weighted MEAV)
	9	ln(Control centre) = a + b1*ln(total faults and onis) + b2*ln(employees)
	10	ln(Call centre) = a + b1*ln(Total faults) + b2*ln(total onis)
	11	ln(network design+project mgmt+sys mapping) = a + b1* ln(weighted MEAV)

Totex Mode: Disaggregated Activity-based

The current Bottom-Up regression takes into account the following disaggregated level analysis:

- Units Distributed
- Network Length
- Customer Number
- MEAV
- Overhead Line Length
- Number of Faults
- Number of ONIs
- Spans Cut

We believe a DNOs work constitutes:

- Maintaining and Improving its Assets:
    - OHL and UG Cables
    - Substation and related assets
- Ensuring customers supply

A DNO's asset base can be summarised by its Network Length and MEAV. We believe that since Overhead Line Length is a constituent of Network Length, its exclusion would be appropriate. The inclusion of Number of Faults and Number of ONIs would benefit DNOs with a large number of faults. We believe that this should not be the case, since it incentivises poor Fault performance. The inclusion of MEAV caters to the asset base and its Fault performance should not inversely determine its Totex allowance. We tested for the exclusion of overhead line length, number of faults and number of ONIs.

This revised CSV produced only a marginally improved R^2. As such we do not propose any amendments to the current regression model.

Totex Mode: Macro cost drivers

The current Macro regression takes into account the following drivers:

- Network Length
- Customer Numbers
- Units Distributed

We believe that the above drivers do not take into account SHEPD's sparse or LPN's dense network. In order to incorporate this factor, we tested for the inclusion of density in the macro regression.

This revised CSV produced a much poorer totex function. As such we do not propose any amendments to the current regression model.

Trouble Call (Faults)

The current regressions assess Fault Costs to the related Volume. It does not take into account variation of costs due to density or the fact that the cost to fix faults differs between assets based on the asset's complexity. Using the assumption that an increase in complex assets within a DNOs asset base would be noticed in its MEAV, Ofgem's "weighted MEAV" was considered a proxy for differing asset portfolios amongst DNOs. In order to assess these factors, the regression was tested for the inclusion, replacement and combination of Weighted MEAV and density.

This revised CSV produced some forms with an improved R^2. However the improvement was not marked and as such we do not propose any amendments to the current regression model.

Closely Associated Indirects

Control Centre

Ofgem's Control Centre regressions take into account:

- Total Faults and ONIs
- Total Employees

These drivers incentivize a DNO to deteriorate its Fault rate as well as increase its Total Employees. We believe that these two factors do not influence a DNO's Control Centre Costs. A Control Centre's costs are related to a DNO's delivery to customers (units distributed and reliability of assets), weather related events and the network's structure. Due to the availability of data, we believe that units distributed out of all the mentioned factors should be accounted for in Control Centre costs. The Control Centre regression was tested for the inclusion, replacement and combination of Units Distributed.

This revised CSV produced some forms with a marginally improved R^2. However the improvement was not marked and as such we do not propose any amendments to the current regression model.

Call Centre

The current drivers for Call Centre Costs are:

- Total Faults
- Total ONIs

As stated before, these drivers incentivize a DNO to deteriorate its Fault rate. We believe that the Call Centre caters to Customers towards the end product of a DNO; the reliability of supply. The inclusion of units distributed would account for this. The Call Centre regression was tested for the inclusion, replacement and combination of units distributed.

This revised CSV produced some forms with a marginally improved R^2. However the improvement was not marked and as such we do not propose any amendments to the current regression model.

Network Design, Project Management and System Mapping

Ofgem's model takes into account weighted MEAV. We believe that this is too simplistic to account for a DNO's overall "Asset base". However, given limited data availability, the inclusion, replacement and combination of units distributed and customers were tested to account for aspects of a DNO's area and necessity of network reliability.

The revised CSV produced some forms with an improved R^2. This appeared to be a result of the incorporation of customer numbers or units distributed. There is some potential merit in exploring further a small amendment to this regression model for the additional explanatory variable.

Alternative Modelling

Figure 16. Summary of alternative regression models

Model	Adj. R^2	Intercept	Coefficients
Totex: Activity-Level base model			

mdl1_0	85%	(Intercept) : 0.59	ln(BU_CSV) : 0.89		
mdl1_1	86%	(Intercept) : 0.69390	ln(BU_CSV_a) : 0.89654		
Totex: Macro CSV model					
mdl2_0	86%	(Intercept) : -4.2371	ln(macro_csv) : 0.82357		
mdl2_1	21%	(Intercept): 0.3477	ln(macro_csv_a): 0.504498		
Trouble Call – LV Plant					
mdl5_0	21%	(Intercept) : -7.9902	ln(faults_lv_pe) : 1.2021		
mdl5_1	34%	(Intercept) : -10.550	ln(faults_lv_pe) : 1.2512	ln(density) : 0.45013	
mdl5_2	30%	(Intercept) : -16.400	ln(faults_lv_pe) : 1.2332	ln(weighted_MEAV) : 1.0494	
mdl5_3	35%	(Intercept) : -14.594	ln(faults_lv_pe) : 1.2572	ln(density) : 0.34777	weighted_MEAV=0.57725
mdl5_4	10%	(Intercept) : -3.1546	ln(density) : 0.41885		
mdl5_5	7%	(Intercept) : -8.7635	ln(weighted_MEAV) : 0.98515		
mdl5_6	10%	(Intercept) : -6.9557	ln(density) : 0.32165	ln(weighted_MEAV) : 0.54731	

Trouble Call – HV Plant					
mdl6_0	22%	(Intercept) : -4.1976	ln(faults_hv_pe) : 0.73236		
mdl6_1	20%	(Intercept) : -4.2921	ln(faults_hv_pe) : 0.73629	ln(density) : 0.014221	

mdl6_2	25%	(Intercept) : -6.7544	ln(faults_hv_pe) : 0.66454	ln(weighted_MEAV) : 0.37560	
mdl6_3	24%	(Intercept) : -7.0440	ln(faults_hv_pe) : 0.62066	ln(density) : -0.080038	weighted_MEAV=0.49622
mdl6_4	-2%	(Intercept) : 0.129	ln(density) : -0.024853		
mdl6_5	7%	(Intercept) : -4.3281	ln(weighted_MEAV) : 0.55233		
mdl6_6	10%	(Intercept) : -5.2393	ln(density) : -0.1621		
Control Centre					
mdl9_0	63%	(Intercept)=-5.35711	employees=0.701863	faults_total_onis=0.164478	
mdl9_1	65%	(Intercept)=-5.18846	employees=0.807870	faults_total_onis=0.311135	units_dist=-0.247717
mdl9_2	30%	(Intercept)=-3.01929	units_dist=0.441640		
Call Centre					
mdl10_0	43%	(Intercept)=-4.3853	faults_total=0.193781	onis_faults=0.310915	
mdl10_1	47%	(Intercept)=-5.05610	faults_total=0.0887307	onis_faults=0.163258	units_dist=0.316150
mdl10_2	46%	(Intercept)=-4.81751	units_dist=0.54073		

Network Design, Project Management and System Mapping					
mdl11_0	24%	(Intercept)=-0.942865	weighted_MEAV=0.451275		
mdl11_1	65%	(Intercept)=-4.43912	weighted_MEAV=-0.450204	units_dist=1.06642	

mdl11_2	71%	(Intercept)=-9.50069	weighted_MEAV=-0.455087	customers=1.08186	
mdl11_3	71%	(Intercept)=-9.25112	weighted_MEAV=-0.462900	customers=1.02181	units_dist=0.068751
mdl11_4	58%	(Intercept)=-4.17371	units_dist=0.683281		
mdl11_5	64%	(Intercept)=-7.6221	customers=0.705658		
mdl11_6	63%	(Intercept)=-8.81302	customers=0.986679	units_dist=-0.290518	

Appendix C - July 2013 Submission

The following sections are taken from our July 2013 plan. They have been included for reference.

Comparative efficiency

Analysis undertaken by the energy regulator, Ofgem, has demonstrated that SSEPD is the most efficient electricity distribution licensee. Our updating of this analysis confirms that SSEPD remains at the efficiency frontier.

In this section we consider the evidence for the comparative efficiency of DNOs. This is based on the approach used by Ofgem; most recently in its decision[2] for the RIIO-ED1 period.

Comparative efficiency analysis is an important part of Ofgem's regulatory framework. By comparing the performance of licensees that are providing a similar service to their customers, Ofgem is able to take a view on efficient levels of expenditure and, hence, challenge poorly performing networks to improve.

In this section we present evidence to demonstrate that SSEPD has historically been at the forefront of efficiency. We describe the various methods used to establish our efficiency relative to the other DNOs and present our views on those methods. We also demonstrate that we continue to be at the frontier of efficiency today.

This analysis demonstrates that SSEPD has been operated extremely efficiently over the last 15 years and our business model will focus on this ethos of continuous improvement for the RIIO-ED1 period. We will continue our operational focus on efficiency and will drive out efficiency savings wherever possible. We expect to be setting the standard for efficiency for the next decade and beyond.

[2] Ofgem, "Tools for cost assessment": /www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1DecCostAssessment.pdf

Historical assessment of comparative efficiency

In analysis undertaken by Ofgem, SSEPD has historically been at the forefront of efficiency.

During the Distribution Price Control Review 4 (DPCR4) for the period 1 April 2005 to 31 March 2010, Ofgem assessed the comparative efficiency of DNOs' operating and capital costs. This assessment process was extensive and lasted for over a year.

In order to assess DNOs' operating costs, Ofgem used a five stage approach:

1. A review of the cost and efficiencies achieved by DNOs during the existing price control period and their projected efficiencies for the next price control period;
2. The development of "normalised" and comparable cost information using actual costs from 2002/03;
3. A comparison of actual normalised costs, using top-down benchmarking, to help estimate efficient cost levels;
4. The consideration of other information on efficiency (from Ernst & Young and other industry experts) including DNOs' forecasts of changes in activity levels and new future costs, adjusting results where necessary, and rolling forward to 2010; and,
5. The addition of other cost items estimated separately (such as business rates and pension costs) to provide a final operating cost allowance.

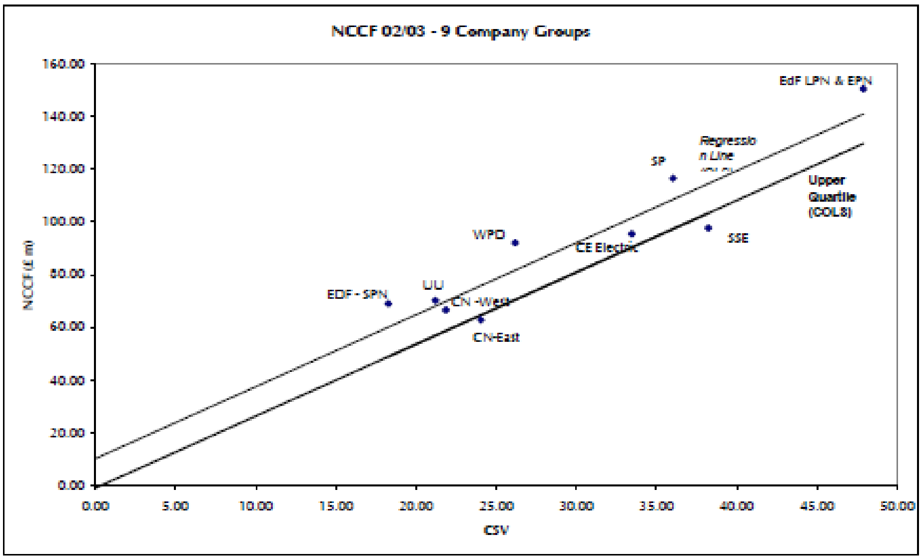
In order to assess capital costs, Ofgem employed the services of engineering consultants, PB Power, to establish whether the proposals put forward by DNOs represented value for money for customers. In conjunction with Ofgem, PB Power developed models for load-related and non load-related expenditure to allow an assessment of each DNO's proposals on a consistent basis.

Ofgem's DPCR4 Final Proposals[3] published in November 2004 concluded that SSEPD were the overall industry leader on efficiency of operating costs (**Figure 1**).

This meant that the allowances we received for DPCR4 were higher than we had forecast.

[3] Ofgem, DPCR4 Final Proposals: www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR4/Documents1/8944-26504.pdf

Figure 17: Ofgem's DPCR4 regression using 2002/03 data for nine ownership groups[4]



Ofgem's approach to assessing comparative efficiency during the Distribution Price Control Review 5 (DPCR5) for the period 1 April 2010 – 2015 was similar to its approach in DPCR4. However, Ofgem considered that, by using four years of annual regulatory reporting, they had much more robust data on which to base their benchmarking assessments.

The DNOs' capital costs were assessed through Ofgem's own models, taking into account historic performance and input from Ofgem's engineering consultants, PB Power. In order to assess operating and direct costs, Ofgem carried out a number of regression analyses and used a selection of disaggregated benchmarking studies. The outcome of Ofgem's assessment of Network Operating Costs is illustrated in **Figure 2**.

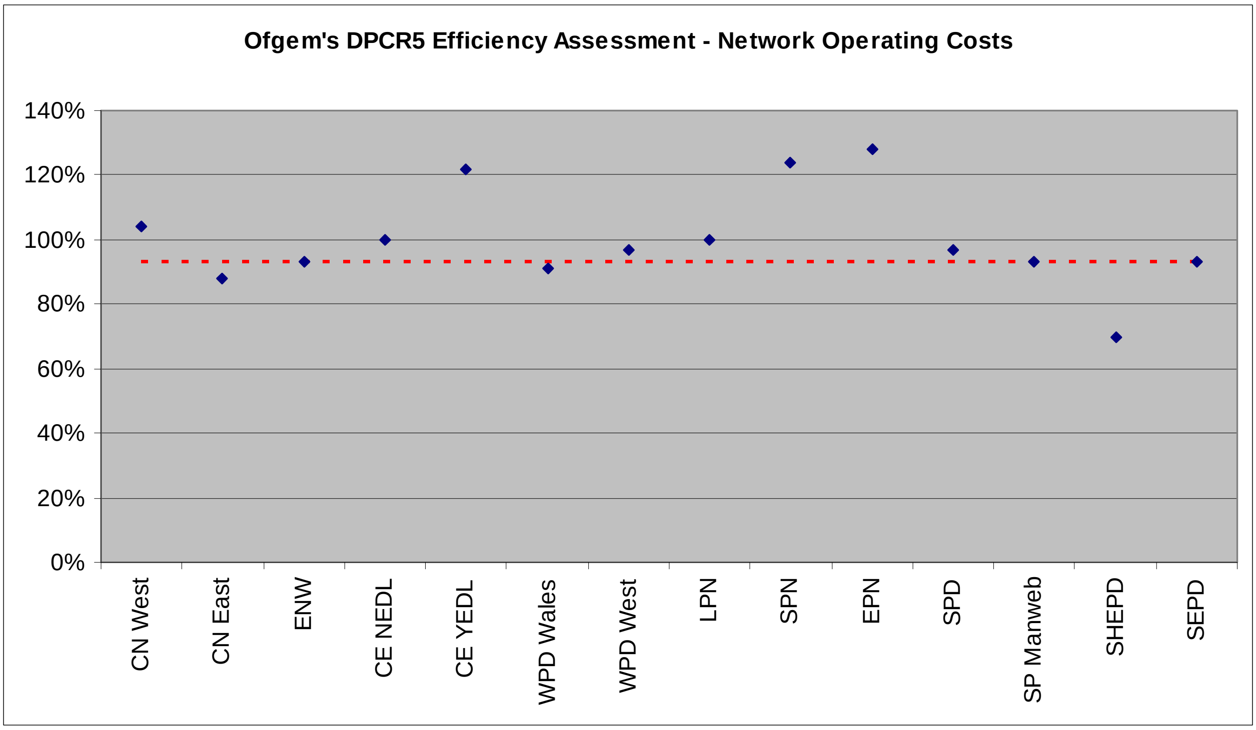
Ofgem's DPCR5 Final Proposals[5] stated, when they proposed to apply future productivity assumptions to cost allowances:

[4] Ofgem, DPCR4 Final Proposals:
www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR4/Documents1/8944-26504.pdf

[5] Ofgem, DPCR5 Final Proposals:
www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR5/Documents1/FP_1_Core%20document%20SS%20FINAL.pdf

”These cuts do not fall equally on all DNOs. The two most efficient DNOs received broadly what they asked for in their forecasts. In total we have made a 0.2 per cent increase on SSE's forecast”.

Figure 18: Ofgem's DPCR5 Regression using data from 2005/06 to 2008/095



Comparative efficiency since 2010 and during RIIO-ED1

It is Ofgem's intention, during the RIIO-ED1 review, to continue to assess comparative efficiency through the use of benchmarking models. In Ofgem's Strategy Decision document "Tools for cost assessment"[6], published in March 2013, Ofgem set out their intention to use two types of benchmarking model, one of which will consider the comparative efficiency of a DNO's total expenditure and the other will consider the comparative efficiency of specific DNO cost categories.

Benchmarking is simply the process of comparing one DNO's costs to the rest of the DNO group in order to establish an industry "best" or benchmark.

There are a number of different ways to benchmark relative efficiency:

- Comparison of total expenditure across DNOs (totex benchmarking)
- Comparison of unit costs and econometric analysis across DNOs (disaggregated benchmarking)
- A combination of both approaches

The totex benchmarking method identifies a small number of key cost drivers and compares total expenditure against those drivers for each network. For example, the key cost drivers identified may be the number of customers served, the length of network or the maximum electrical load delivered across the network.

This method of benchmarking takes account of trade-offs between operating costs and capital costs by assessing DNO costs in the round. For example, if one DNO prefers to simply replace assets rather than refurbish those assets, we might expect their operating costs to be low and their capital costs to be high. If operating costs and capital costs are assessed separately, without reference to each other (as is done in the disaggregated method), the DNO could look efficient in their operating costs (as they will seem lower than other DNOs who are taking a different approach to asset replacement) but might look inefficient in their capital costs. By reviewing expenditure in the round, any allocation of costs between operating costs and capital costs are fairly reflected and an overall assessment of efficiency can be made.

[6] Ofgem, "Tools for cost assessment": http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1DecCostAssessment.pdf

The disaggregated benchmarking method compares expenditure on specific items such as transformers, cable and overhead line across each network. This is the unit cost part of the analysis. It also compares the costs of services and business support across each network, which is the econometric part of the analysis.

Whilst the results of benchmarking studies are a useful part of any toolkit for assessing relative efficiency, they cannot provide definitive answers. This is because some networks have specific characteristics which are peculiar to them. For example, the network in London covers an area of intense population density which leads to a higher use of underground cable. Likewise, our network in the North of Scotland covers an area with very low population density and therefore the length of network per customer is significantly higher than in other areas. Both networks will incur costs which are very specific to them and subsequently skew benchmarking results. As a result, adjustments must be made to the benchmarking models to ensure the differences between networks are accounted for. Notwithstanding the differences in some networks, where appropriate adjustments are made, benchmarking can be a useful tool in assessing the comparative efficiency of DNOs.

Ofgem have set out, in their March 2013 Strategy Decision document6, that benchmarking will *"inform but not determine"* their assessment of the DNOs' forecast costs for RIIO ED1. We welcome this approach, along with Ofgem's intention not to carry out benchmarking in a mechanistic way. We also welcome Ofgem's recognition that:

> "*…using a variety of approaches acknowledges that there is no one correct model for assessing comparative efficiency but a number of plausible ones."*

We have completed our own assessment of comparative efficiency, based on the approach set out by Ofgem in their March 2013 Strategy Decision document6. However, the data required to complete a comprehensive analysis will not be available until all the DNOs have published their Business Plans on 1 July 2013. We have completed our own efficiency assessment using the most recent data available – 2010/11 and 2011/12 actual expenditure for each DNO. We believe this data is robust and sufficiently comparable across all DNOs to constitute an appropriate dataset to undertake an efficiency assessment at this stage. This is also the dataset used by Frontier Economics to inform their totex assessment, and is the dataset used by Western Power Distribution (WPD) in the disaggregated model.

Our efficiency assessment below considers all of the GB DNOs. There are six companies who are responsible for the 14 licensed DNOs in GB:

- Western Power Distribution (WPD) is responsible for West Midlands (WMID), East Midlands (EMID), South Wales (SWales) and South West (SWest).
- Northern Powergrid (NPG) is responsible for Northern (NPGN) and Yorkshire (NPGY).
- UK Power Networks (UKPN) is responsible for London (LPN), South East (SPN) and Eastern (EPN).
- SP Energy Networks (SPEN) is responsible for South of Scotland (SPD) and Cheshire/Merseyside/North Wales (SPMW).
- Electricity North West (ENW) is responsible for the North West (ENWL).
- Scottish and Southern Energy Power Distribution (SSEPD) is responsible for North of Scotland (SHEPD) and South of England (SEPD).

Totex benchmarking

The totex benchmarking model that has been developed to assess the relative efficiency of total expenditure for RIIO-ED1 has been developed by the economic consultancy, Frontier Economics[7].

This model is intended to assess relative efficiency based on the sum of the DNOs' operating costs and capital costs, excluding those costs which are outwith the control of the DNO.

There are two key challenges when using the totex model to assess relative efficiency:

1. Using the correct cost drivers is critical to the outcome of the assessment. If inappropriate cost drivers are used, results will be skewed and efficiency assessments distorted.
2. Regional differences between DNOs must be accounted for. If these are not accounted for, the results will be distorted.

The key cost drivers that Frontier Economics have used to assess relative efficiency are:

- Number of customers served by the network; and,

[7] Frontier Economics report: www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=9&refer=NETWORKS/PRICECONTROLS/WEBFORUM

- Peak load across the network.

This means that the model compares total expenditure with customer numbers and peak load for each of the DNOs. The model also adjusts for regional salary variances across each DNO.

The outcome of the Frontier Economics totex model is that our network in the south of England is in the upper quartile of efficiency, ranked third most efficient DNO (**Figure 3**). Our network in the north of Scotland is ranked eleventh out of fourteen.

Figure 19: Frontier Economics totex benchmarking assessment 2010/11 and 2011/12

	All DNOs	
DNO	Efficiency score	Ranking
WMID	83.97%	13
EMID	94.74%	5
ENWL	90.01%	8
NPGN	93.76%	7
NPGY	100.00%	1
SWales	99.64%	2
SWest	96.69%	4
LPN	89.62%	9
SPN	87.43%	10
EPN	84.20%	12
SPD	94.10%	6
SPMW	82.00%	14
SHEPD	86.53%	11
SEPD	99.61%	3

We do not believe that this initial assessment of totex efficiency is credible for the reason that neither of the two key challenges to totex benchmarking have been addressed. The initial assessment by Frontier Economics, as illustrated above, does not use appropriate cost drivers and makes no adjustment for regional differences between networks.

As we will go on to demonstrate in the next section of this paper, both of our networks are operated in the same way, with exactly the same focus on efficient performance. Ofgem have also recognised, in previous price control reviews, that both networks have historically been at the frontier of efficiency.

Given that our network in the south of England scores well in totex benchmarking but our north of Scotland network does not, and yet both are operated in the same way, we strongly believe that the difference in rank is due to regionally specific costs which affect only the north of Scotland network, and the customer number cost driver. In this type of benchmarking assessment, the north of Scotland network is known as an “outlier” and serves to skew the result of totex benchmarking when left unadjusted for, as **Figure 3** shows.

There are two possible approaches to ensuring that regionally specific factors do not skew the results of totex benchmarking assessments:

- Remove the outliers and continue to assess the remaining DNOs on the basis of the original drivers (customer numbers and peak load); or,
- Assess totex efficiency based on a driver which more accurately reflects both the regionally specific factors.

Ofgem have recognised, in previous price control reviews, that our network in the north of Scotland has some unique characteristics which result in specific costs which are not incurred by other DNOs. In their DPCR4 Final Proposals document[8], they said:

> *"SHEPD has a very large sparsely populated territory and, as a result, incurs additional operating costs."*

Analysis using the first approach has also been completed by Frontier Economics, who concluded that both "SSEH" (SHEPD) and LPN were outliers in the initial assessment[9]:

> *"As we have noted above, our analysis of the detailed composition of the density of each DNO's service region has highlighted both LPN and SSEH as potential outliers, with characteristics markedly different from those of more typical GB DNOs."*

Both DNOs are outliers primarily due to sparsity and density factors. In other words, the population in London is extremely dense and the population across the north of Scotland is extremely sparse when compared with any of the other DNOs. This leads to specific costs which do not apply to any of the other DNOs and, as a result, make the outliers look less efficient than they actually are.

The remaining 12 DNOs, however, are fairly similar to each other and such factors are unlikely to be sufficiently material to skew the results of totex benchmarking assessments (**Figure 20**).

Once the outliers are removed from the model, the outcome of the modelling exercise is slightly different. Our south of England network is ranked second, far into the upper quartile (

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[8] Ofgem's DPCR4 Final Proposals: www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR4/Documents1/8944-26504.pdf

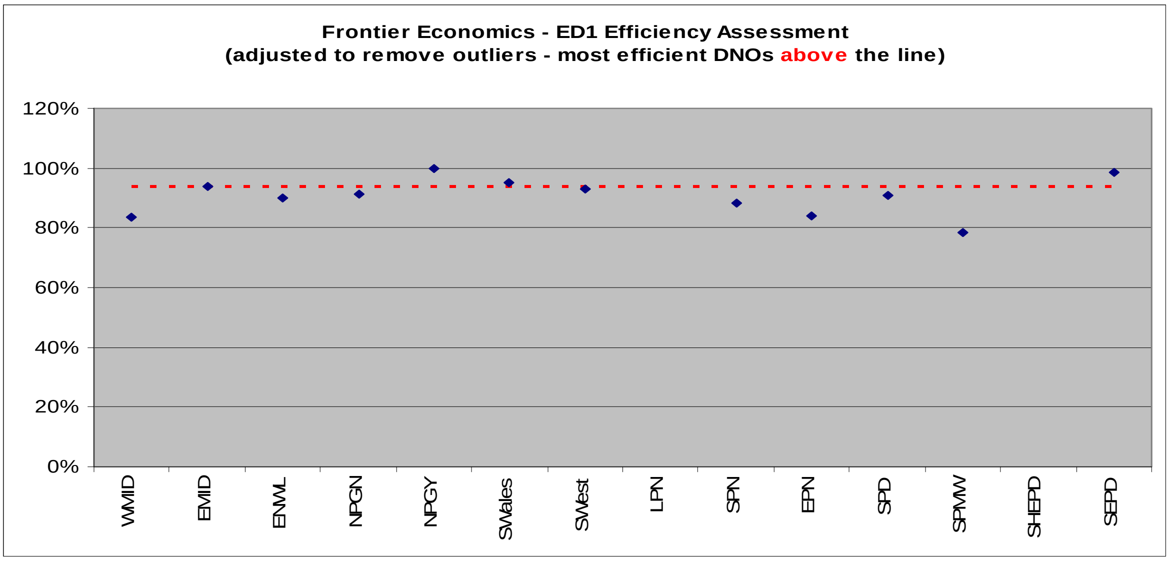
[9] Frontier Economics report: www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=9&refer=NETWORKS/PRICECONTROLS/WEBFORUM

Figure 21). It is clear from this analysis that our Southern network remains extremely efficient. We also believe that our north of Scotland network continues to be extremely efficient when normalised for regional costs.

Figure 20: Frontier Economics totex benchmarking assessment 2010/11 and 2011/12, outliers removed

	LPN and SHEPD excluded	
DNO	Efficiency score	Ranking
WMID	83.52%	11
EMID	94.06%	4
ENWL	90.00%	8
NPGN	91.49%	6
NPGY	100.00%	1
SWales	95.20%	3
SWest	92.90%	5
LPN	-	-
SPN	88.24%	9
EPN	84.06%	10
SPD	90.78%	7
SPMW	78.60%	12
SHEPD	-	-
SEPD	98.55%	2

Figure 21: Frontier Economics totex benchmarking assessment 2010/11 and 2011/12, with outliers removed



The second approach is to revise the totex benchmarking analysis based to use cost drivers other than customer numbers or peak load across the network. The objective is to use cost drivers which more accurately reflect regionally specific factors, thus reducing the likelihood of the results being skewed by outliers; although this does have the potential to create new outliers.

Two cost drivers which may go some way towards reflecting regionally specific factors are the length of network and customers per kilometre of network.

A DNO can only develop their network where there are customers but equally must serve each and every customer in their area. As a result, the length of the network will be largely determined by the geographical spread of customers in the DNO's area. Some DNOs will therefore require more assets to serve the same number of customers (**Figure 6**).

In other words, if the total expenditure actually reflects the volume of assets in service (i.e. length of network) but is only compared based on number of customers served, our north of Scotland network looks only half as efficient as the next DNO. If, however, the length of network is used as a cost driver, some of these differences will be smoothed out.

Similarly, when considering customers per kilometre as a driver, our network in the north of Scotland serves around half the number of customers per kilometre of network than the next nearest DNO.

Figure 22: Comparison of customers served per kilometre

DNO	Customers Served	Length of network	Customers per km
SHEPD – North of Scotland	754,775	47,478	15.9
SEPD – South of England	2,977,416	76,725	38.8
LPN - London	2,267,440	36,596	62.0
Industry Average	2,084,629	56,803	36.7

For example, if one DNO can serve 100 customers with 1 kilometre of network but another must operate and maintain 50 kilometres of network to serve 100 customers, it is quite clear that an assessment based on number of customers only will provide very different results than an assessment of cost per customer per kilometre of network.

This variance in the outcome of the efficiency assessment depending on the key drivers used or the recognition of specific network characteristics is evidence as to why the results of totex benchmarking should be considered informative but not definitive.

We consider that in order to arrive at a definitive outcome from the totex benchmarking assessment, a detailed and thorough analysis of the appropriate drivers for each DNO would need to be carried out. This has not been done during Frontier Economics' assessment process and it is a complicated and time consuming process. Nevertheless, providing that key differences between DNOs are assessed correctly (including geography, population, company size, asset age etc.), a more robust answer will be revealed.

Outcome of totex benchmarking assessment

It is clear from the assessment set out above that SEPD are in the upper quartile of efficient performance but that a clear analysis of SHEPD's performance cannot be demonstrated without significant restructuring of the number and mix of cost drivers.

As a result, we believe that totex benchmarking is informative but not conclusive and should not be used as the main tool for comparative analysis. Consideration must be given to identify an appropriate number and mix of cost drivers and also costs must be adjusted to reflect obvious regional factors that impact on DNOs.

Disaggregated Benchmarking

The disaggregated model used to assess the relative efficiency of specific cost categories across DNOs has been developed by WPD, building upon the models developed by Ofgem at DPCR5 and discussed and agreed at Ofgem's Cost Assessment Working Group over the past 18 months. The data which has been used to make this assessment is the actual outturn of the first two years of DPCR5 – 2010/11 and 2011/12.

This model compares costs in two ways:

- Unit cost comparisons of actual costs for specific, capital expenditure activities; and
- Partial "regression-type" analysis for indirect and business support costs.

This is the same approach as Ofgem propose in their March 2013 Strategy Decision document6. We agree, with Ofgem, that both cost comparison methods should be used and that the benchmark should be set at the upper quartile.

We note that Ofgem propose to make a qualitative assessment of cost activities which they deem unsuitable for regression analysis. It is difficult to comment on whether this is an appropriate assessment method as there is no detail on how Ofgem plan to carry it out. Furthermore, although Ofgem plan to use econometric analysis in their toolkit for assessing indirect and business support costs, the disaggregated model does not perform that function. It does, however, present a fair comparison of unit costs across operational, indirect and capital costs.

As we explain below, while the results of disaggregated comparisons are not definitive, they are significantly more robust than the results of the totex benchmarking and provide a more realistic assessment of relative efficiency.

As part of our analysis in preparing this paper, we have used the disaggregated model to illustrate the relative efficiency of our DNOs in comparison with the other DNOs.

<u>Overall assessment</u>

We completed our assessment of overall efficiency using three set of analyses:

1. Analysis of the unadjusted Disaggregated Model;
2. Analysis of the Disaggregated Model, adjusted for costs specific to assets and climate found only in the north of Scotland; and,

3. Analysis of the Disaggregated Model, adjusted for costs specific to assets and climate found only in the north of Scotland and the staffing requirements associated with operating in a sparsely populated area.

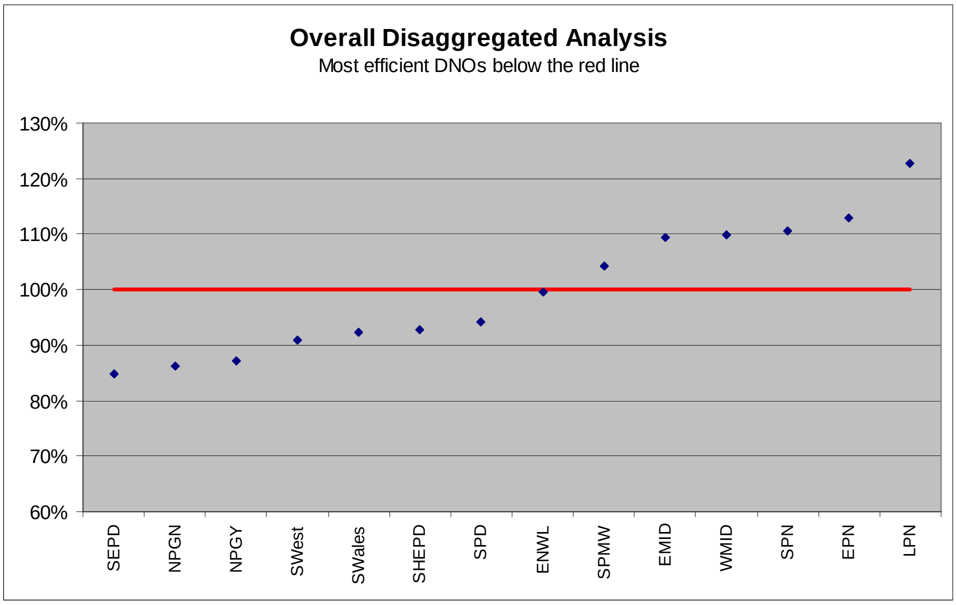
Unadjusted Disaggregated Model

The overall results of the disaggregated benchmarking assessment of efficiency across 2010/11 and 2011/12 (**Figure 23**), demonstrates that our network in the south of England is clearly at the frontier of efficiency, ranked the most efficient DNO and spending only 85% of what the model predicts for a company of that size. This analysis uses the unadjusted model with cost drivers agreed by Ofgem's Cost Assessment Working Group.

Our network in the north of Scotland is ranked 6th most efficient DNO, in the unadjusted analysis, and is spending 93% of what the model predicts for a DNO of that size.

Both networks are considered to be efficient and delivering value for money to the customer by spending significantly less than average to deliver the outputs required.

Figure 23: Disaggregated benchmarking overall unadjusted assessment 2010/11 and 2011/12



Unadjusted analysis	Actual spend as a % of benchmark	Rank
SEPD	85%	1
NPGN	86%	2
NPGY	87%	3
SWest	91%	4
SWales	92%	5
SHEPD	93%	6
SPD	94%	7
ENWL	100%	8
SPMW	104%	9
EMID	109%	10
WMID	110%	11
SPN	110%	12
EPN	113%	13
LPN	123%	14

Adjusted Disaggregated Model – Costs specific to climate and assets removed

The results presented above do not include any adjustments for the additional costs associated with operating a large land area, small customer base, rural network in the north of Scotland.

The SHEPD network has a number of costs which are regionally specific and do not apply to any other DNO. There are two broad categories of these regionally specific costs:

- Specific costs related to assets and climate found only in the north of Scotland; and,
- Specific indirect and business support costs associated with the staffing requirements for a sparsely populated area.

The first category contains costs associated with the following:

- The provision of standby diesel generation on six islands – no other DNO is required to provide diesel generation on a material basis;
- The operation and maintenance of over 108 submarine cables – no other DNO has to operate and maintain the volumes and numbers of submarine cable which are installed in our north of Scotland network;
- The operation of a Private Mobile Radio (PMR) network – due to difficulties with mobile phone reception in the more remote parts of our north of Scotland network, we need to operate a PMR network to communicate with our staff in the field; and,
- The impact of severe weather, worse than a 1 in 20 year event – due to the geography and terrain, and the more northerly location, our network in the north of Scotland is subject to more frequent severe weather and, during that severe weather, access to repair the network is significantly reduced when compared with other DNOs. In 2011/12, we were subject to an abnormal year with five exceptional events over the winter period.

These costs can be ring-fenced and removed from modelling to mitigate their skewing effect.

As **Figure 8** demonstrates, the rank of SHEPD improves to fourth when the actual regional factor costs for the first two years of DPCR5 are removed from the model inputs and the overall model rerun. We consider this approach to be a more accurate assessment of our relative efficiency, especially given that both networks are managed and operated in exactly the same, efficient way.

Figure 24: Disaggregated benchmarking assessment, DNO rank for 2010/11 and 2011/12, SHEPD regional asset and climate costs adjusted

Excluding 1-in-20, Island Diesel Gen, Submarine Cables, Private Mobile Radio System	Actual spend as a % of benchmark	Rank
SEPD	85%	**1**
NPGN	86%	2
NPGY	87%	3
SHEPD	87%	**4**
SWest	91%	5
SWales	92%	6
SPD	94%	7
ENWL	100%	8
SPMW	104%	9
EMID	110%	10
WMID	110%	11
SPN	111%	12
EPN	113%	13
LPN	123%	14

Adjusted Disaggregated Model – Costs specific to climate, assets and population sparsity removed

The second category contains costs associated with the staffing requirements of a sparsely populated area. Due to the fact that large sections of our network are in very remote and inaccessible areas, and we cover a vast geographical area, we must ensure that we have sufficient number of staff within an appropriate distance of the network to be able to respond quickly to supply interruptions. Although our north of Scotland network only serves 2.6% of the GB population, it covers around 25% of the UK land mass. This requires a proportionately higher number of staff on the ground and associated buildings and vehicles. For example, our depot staff in the north of Scotland totals 432, whereas our depot staff in the south of England totals 637, even though our south of England network serves almost 4 times as many customers as our north of Scotland network.

The table below (**Figure 25**) demonstrates that our network in the south of England, which is representative of a typical GB network, serves 4,661 customers per staff member. However, due to the reasons set out above, our north of Scotland network serves only 1,737 customers per staff member.

Based on our analysis, which is set out in our supporting paper on regional factors, we demonstrate that a total of £4.8 million (2012/13 basis) should be removed from various categories of expenditure as these are costs which are only incurred by SHEPD due to the impact of sparsity.

Figure 25 Comparison of customer to staff ratio between SHEPD and SEPD

SHEPD Depot	Customers	Staff	Customers : Staff ratio
Western Isles	17,434	33	528
Orkney	12,737	20	637
Shetland	13,381	16	836
Argyll	73,020	68	1,074
Highland	114,551	94	1,219
Tayside and Central	233,695	101	2,314
North East	285,628	100	2,856
TOTAL	750,446	432	1,737

TOTAL SEPD Depots	2,967,585	637	4,661

These costs specific to only the north of Scotland network should also be removed from the disaggregated benchmarking to mitigate the impact of skewing the results.

As **Figure 10** demonstrates, both of our networks are at the frontier of efficiency when the appropriate regional adjustments are made. Without these adjustments, the relative efficiency of our SHEPD network cannot be appropriately assessed.

It is interesting to note that in this final assessment of relative efficiency, where regional factors are accounted for, the DNO groups sit broadly together in rank order. Although the WPD group is currently WMID, EMID, SWales and SWest, WMID and EMID were, until late 2011/12, owned by Central Networks and the ranking above shows that there may still be some affects of that separate management influence between the DNOs.

This outcome confirms our expectation of our networks' performance relative to each other; Our DNOs are managed by one overall management team and our focus on delivering efficient performance is the same whether the network is located in the north of Scotland or the south of England. As such, we expect that, once regional factors have been adjusted for, the efficiency scores of both of our DNOs will be very similar.

The results also show that, as might be expected, other DNO groups are in the same position. For example, both networks in the Northern Powergrid group are very close to each other in the efficiency scores, ranked 3rd and 4th. Similarly, the three UKPN DNOs are ranked close to each other in 12th, 13th and 14th place.

Figure 26: Disaggregated benchmarking assessment, DNO rank for 2010/11 and 2011/12, SHEPD regional asset, climate and sparsity costs adjusted

Excluding above and also costs associated with sparsity staffing requirements	Actual spend as a % of benchmark	Rank
SEPD	85%	**1**
SHEPD	86%	**2**
NPGN	86%	3
NPGY	87%	4
SWest	91%	5
SWales	92%	6
SPD	94%	7
ENWL	100%	8
SPMW	104%	9
EMID	110%	10
WMID	110%	11
SPN	111%	12
EPN	113%	13
LPN	123%	14

Unit cost comparisons

The unit cost comparisons analyse information provided by each DNO for specific activities. These comparisons include activities such as diversions, low voltage reinforcements, high voltage undergrounding and reconductoring. The completed unit cost comparison has been set out in the disaggregated model used to assess our comparative efficiency.

It is important to bear in mind that unit cost comparisons are not always completely accurate. They depend on each DNO allocating costs in the same way, otherwise a direct comparison is distorted. For example, if one DNO allocates part of their civil works costs to their diversions category but another DNO does not, the former DNO may look as if their civil works costs are more efficient than the latter DNO.

Additionally, as with the totex benchmarking model, unit costs will vary depending on a number of factors, including geography. For example, the cost of installing an overhead line in difficult terrain with limited access in remote areas of Scotland is somewhat higher than the cost of installing a similar overhead line in southern England, where access and terrain is unchallenging.

The unit cost analysis which has been completed using the disaggregated model, demonstrates that SSEPD is the most efficient DNO in a number of expenditure areas. The graphs below show the most efficient DNOs are the furthest below the red line.

In summary, the results show:

- 33kV Asset Replacement (**Figure 11**). These are the costs incurred when replacing 33kV assets. Outcome: SSEPD at the frontier.
- Civil works (**Figure 12**). These are the costs incurred to complete civil works such as excavation, filling and highway reinstatement. Outcome: SSEPD at frontier
- Low Voltage Asset Replacement (**Figure 13**). These are the costs incurred when replacing assets lower than 33kV. Outcome: SSEPD ranked 2nd most efficient DNO.
- Diversions (**Figure 14**). These are the costs associated with moving overhead lines or underground cables to accommodate other users such as Network Rail. Outcome: SSEPD ranked 2nd most efficient DNO.

Figure 27: 33kV Asset Replacement by DNO group 2010/11 and 2011/12

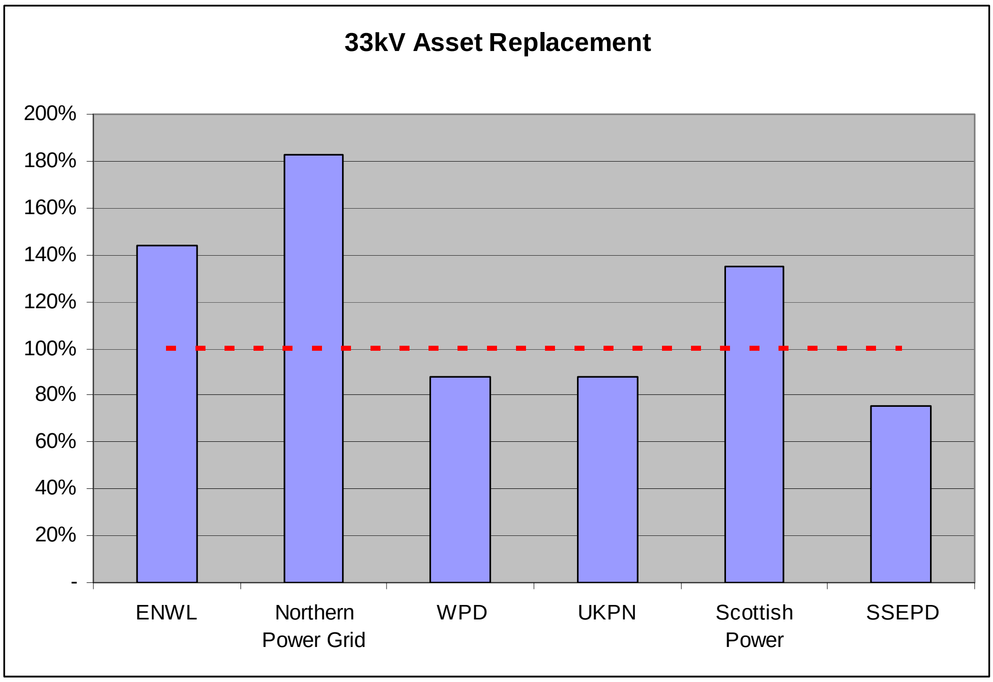


Figure 28: Civil Works by DNO group 2010/11 and 2011/12

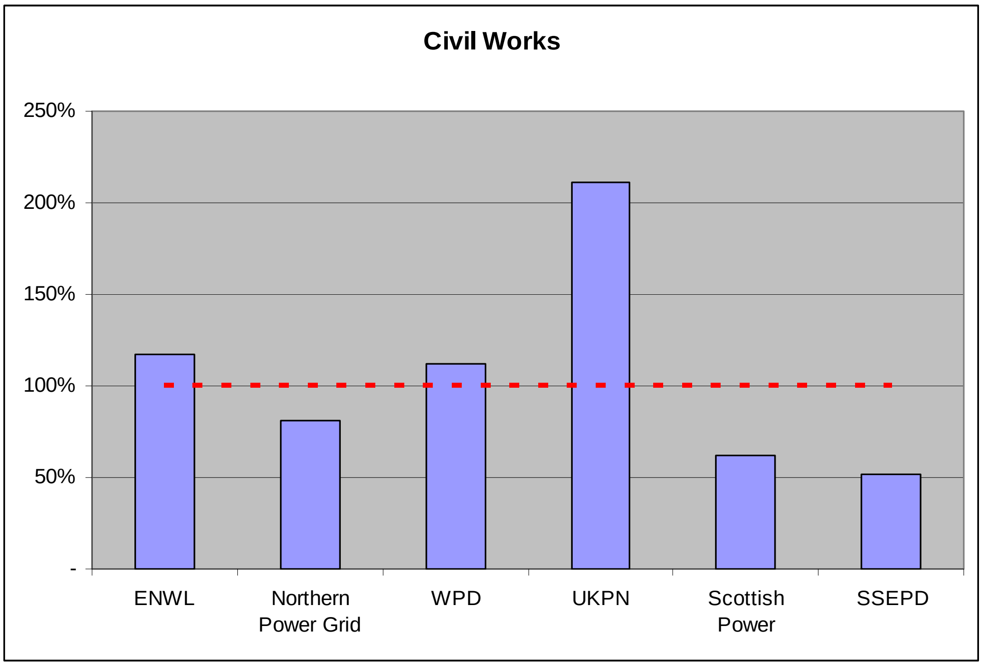


Figure 29: Low Voltage Asset Replacement by DNO group 2010/11 and 2011/12

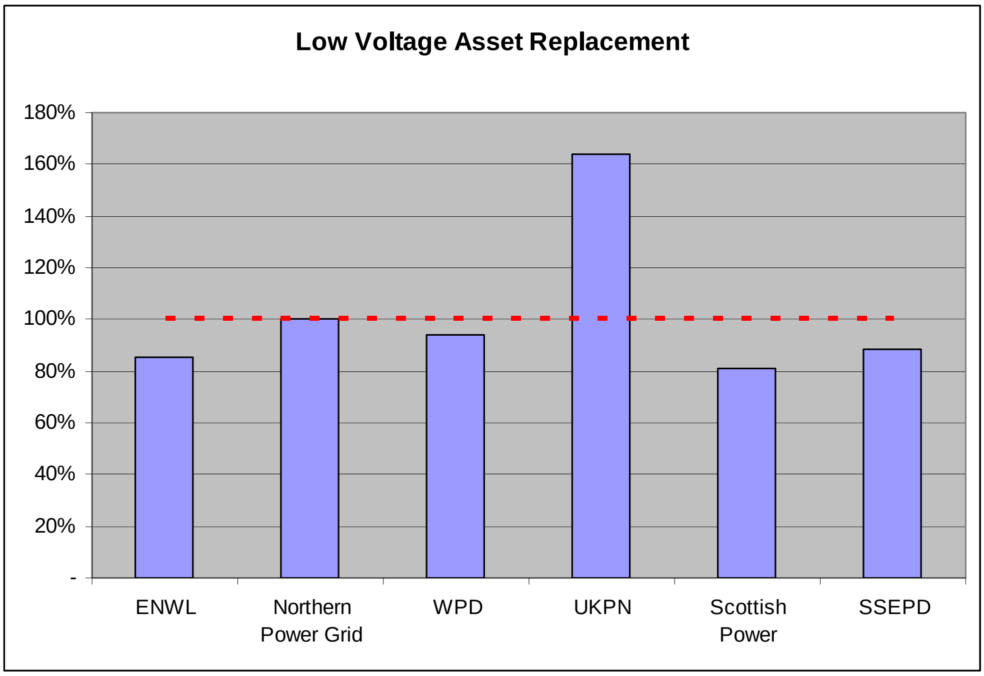
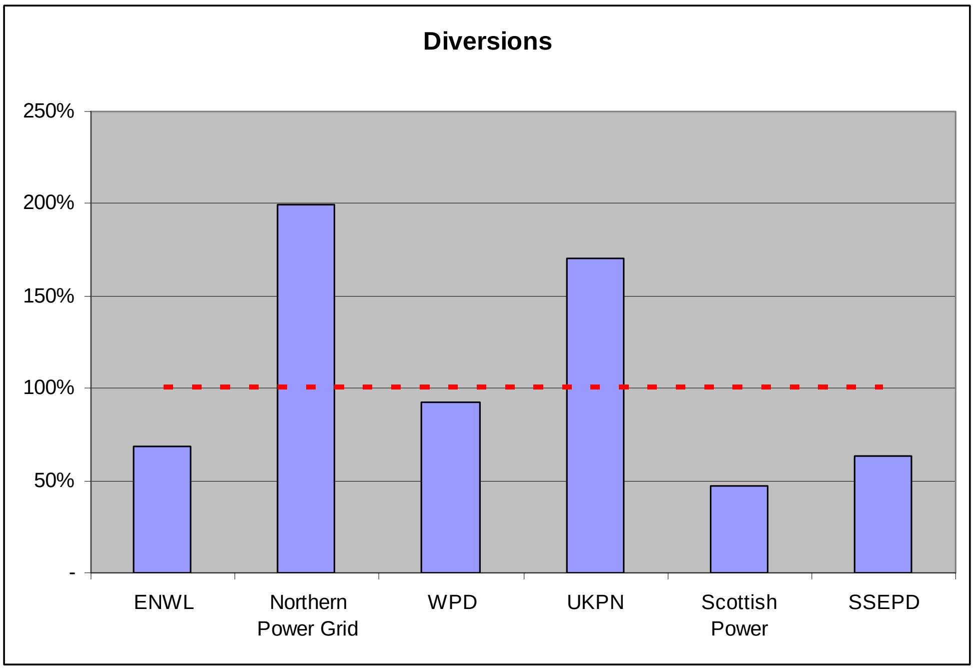


Figure 30: Diversions by DNO group 2010/11 and 2011/12



The results of the unit cost comparison can also be split into each individual DNO rather than aggregated up into DNO group.

In summary, the results of that analysis show:

- 33kV Asset Replacement (**Figure 31**). Outcome: SHEPD ranked 4th most efficient and SEPD ranked 5th most efficient.
- Civil works (**Figure 16**). Outcome: SEPD at frontier and SHEPD 7th most efficient.
- Low Voltage Asset Replacement (**Figure 33**). Outcome: SEPD ranked 2nd most efficient and SHEPD ranked 9th most efficient.
- Diversions (

- Figure 34). Outcome: SEPD ranked 4th most efficient and SHEPD ranked 11th most efficient.

Figure 31: 33kV Asset Replacement by DNO 2010/11 and 2011/12

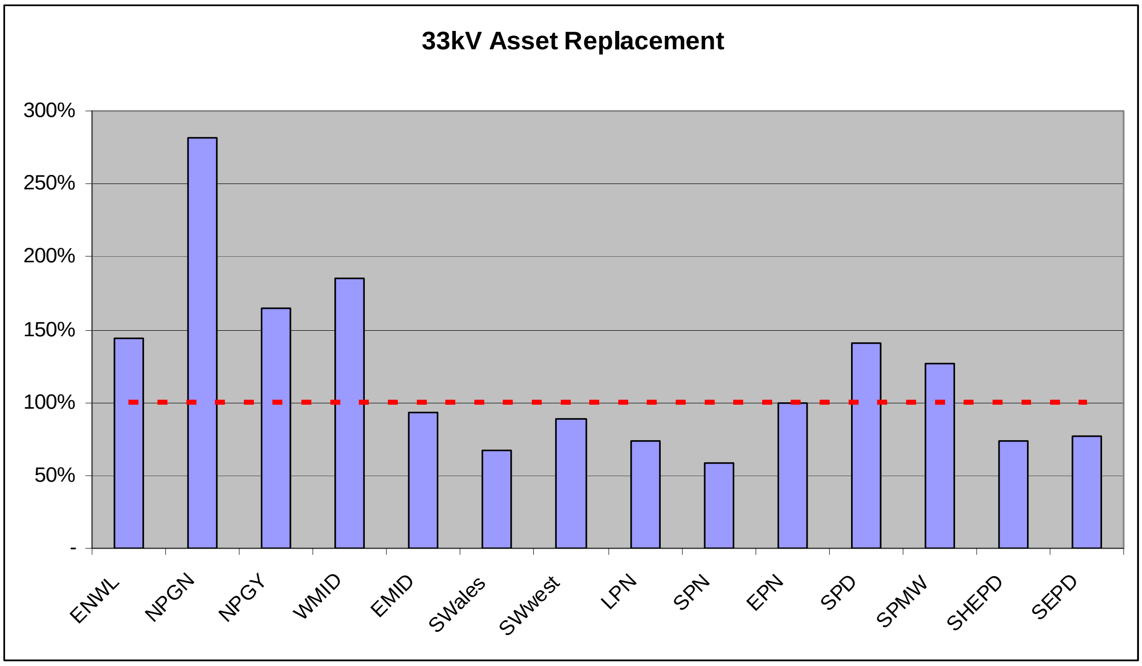


Figure 32: Civil Works by DNO 2010/11 and 2011/12

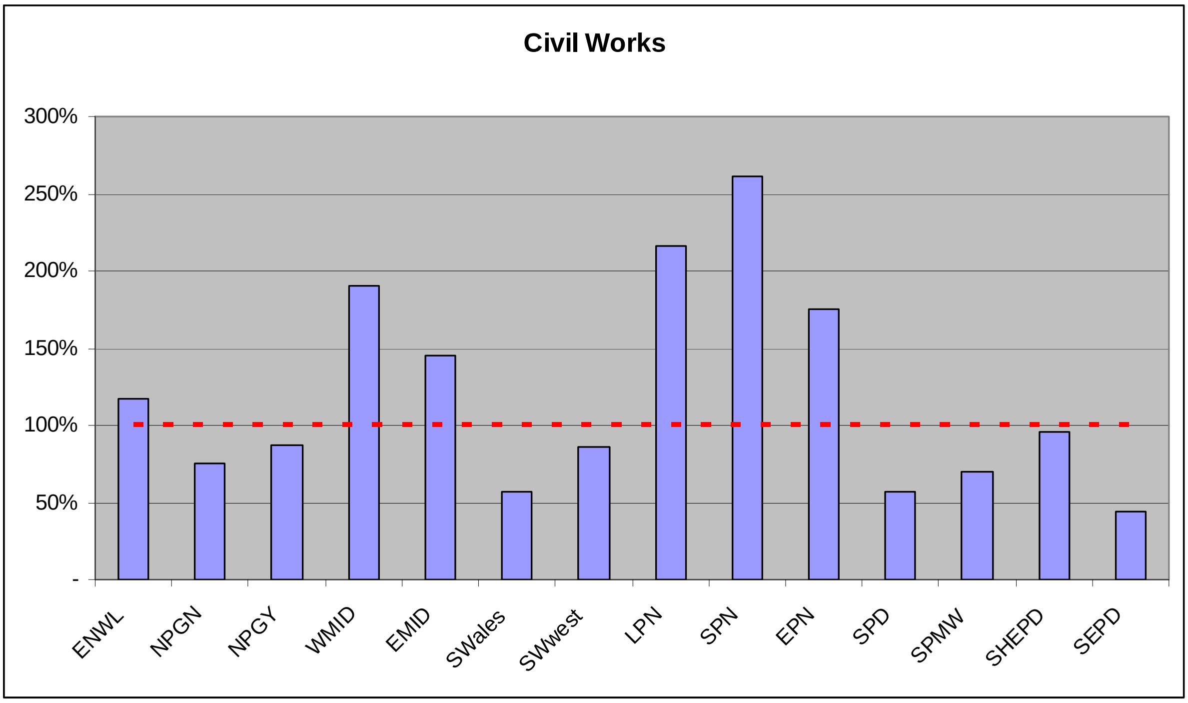


Figure 33: Low Voltage Asset Replacement by DNO 2010/11 and 2011/12

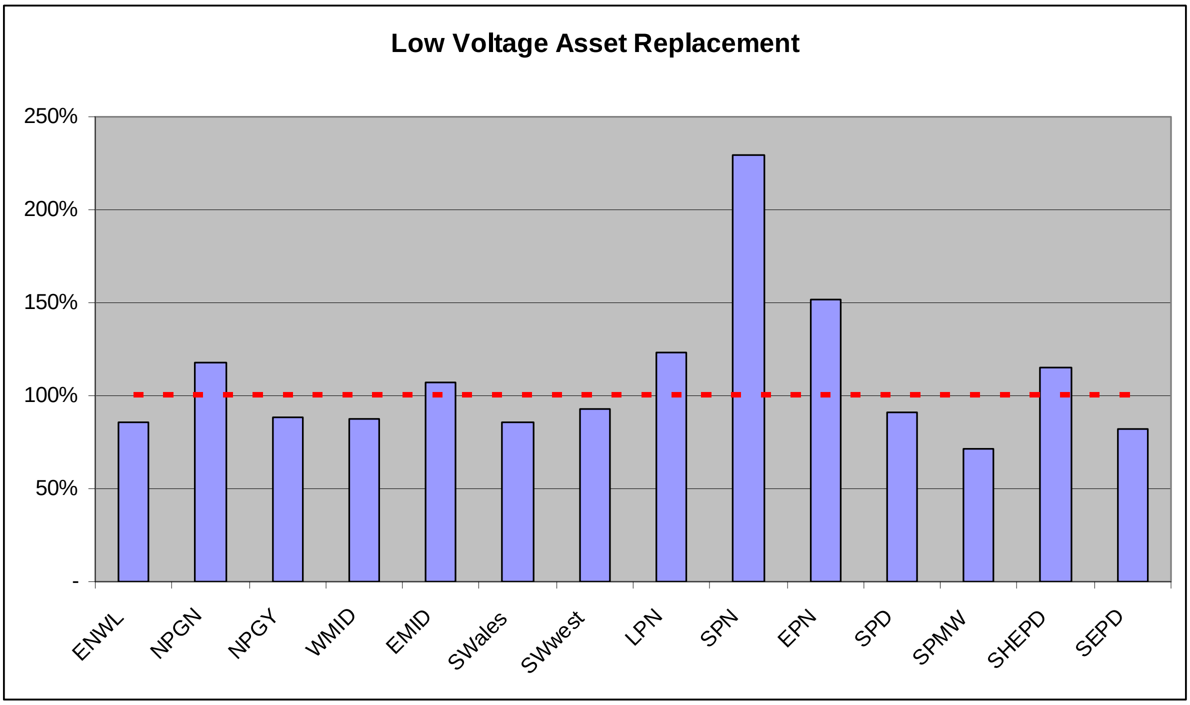
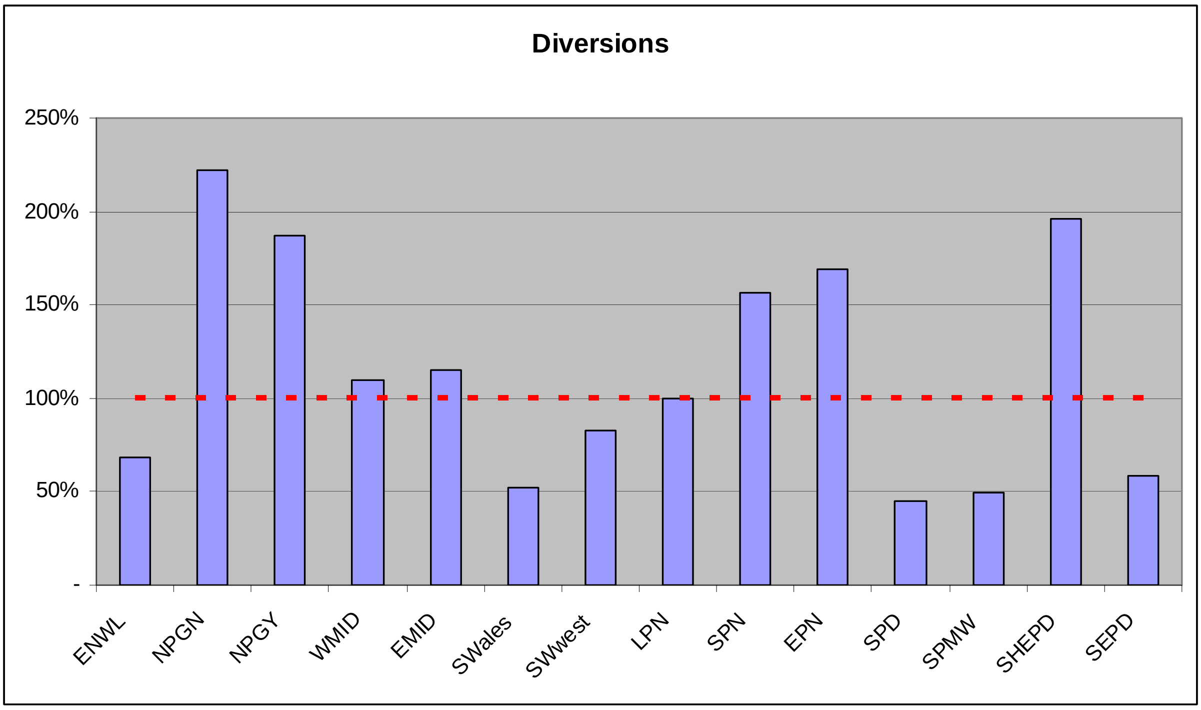


Figure 34: Diversions by DNO 2010/11 and 2011/12



The outcome of this unit cost analysis is consistent with other comparative costs, for example the charges made by DNOs for connection to their network (**Figure 19**). Comparing DNO's published connection charges for 2012/13, both SEPD and SHEPD are below the GB average. For both demand and generation LV connections, we are between 16% and 19% cheaper than the average.

Figure 35: Comparison of unit costs for connection, based on 2012/13 charging statements

	SHEPD	SEPD	Average of all DNOs
Demand Connections			
Demand LV	£699	£649	£797
Demand HV	£5,775	£5,651	£5,998
Demand HV and EHV	£103,543	£263,573	£322,918
Demand EHV and above	£616,220	£798,642	£977,100
Distributed Generation Connections			
LV Metered Generation	£669	£649	£797
HV and EHV Generation	£103,543	£263,573	£322,918

Partial regression-type analysis

The regression-type analysis for indirect and business support costs used in the WPD Disaggregated Model takes an industry average cost for a certain category and assesses whether each DNO has spent more or less in comparison. These costs include categories like call centre provision, control room, stores, HR and other similar costs. This is not traditional, econometric regression analysis but rather a hybrid method which, in effect, assesses operational unit costs.

Taking a very simple example, if the industry average expenditure on call centre provision is £2 million, and the average number of customers served per DNO is just over two million customers, the regression analysis sets the average level of expenditure on call centre provision at £1 per customer served.

The model then goes on to set an “expected” level of expenditure on call centre provision for each DNO based on the £1 per customer served. For example, if a DNO serves five million customers, they should be spending £5 million on call centre provision. The model equally suggests that DNOs who serve a smaller number of customers should be spending a lower amount on call centre provision.

This approach may be appropriate when each DNO serves a similar number of customers. However, when there are material variances in the number of customers served, a risk of skewed results is introduced.

Many of these indirect and business support costs assessed by the regression-type analysis have a lower limit which is not influenced by the drivers used in the model, like customer numbers. In other words, a call centre which is open 24/7 still requires a minimum number of staff to cover shifts and provide the right level of service to customers no matter whether there are 1,000 customers or 100,000 customers. These costs, therefore, become fixed costs and cannot be considered to be driven by the number of customers served. To do so would provide incorrect and inappropriate results. This type of modelling would normally be completed using econometric analysis, which largely accounts for economies of scale. However, the type of analysis used in the Disaggregated Model does not go as far as an econometric assessment and therefore does not account for the differences in company size in relation to customer numbers.

These cost drivers have been extensively discussed and ultimately agreed by Ofgem's Cost Assessment Working Group over the last 18 months and we have left them unadjusted for our initial analysis of relative efficiency.

The table in **Figure 36** sets out a summary of the unadjusted analysis of our closely associated indirect costs:

Figure 36: Unadjusted regression analysis of closely associate indirect costs 2010/11 and 2011/12

Activity	SHEPD	SEPD
Network Design	2	1
Project Management	3	11
EMCS	6	1
System Mapping	1	2
Control Centre	2	1
Call Centre	11	10
Stores	6	2
HR & Operational training	3	4
Vehicles & Transport	4	3
Network Policy	1	2

The following graphs, which are a selection of results from the Disaggregated Model, demonstrate that SSEPD is at the forefront of efficiency across a range of cost categories following partial regression analysis of 2010/11 and 2011/12 expenditure. The line on each graph represents the expected average level of expenditure against a driver, or suite of drivers, within the industry. DNOs on that line are considered to be spending the expected amount on that activity. DNOs above the line are considered to be less efficient and DNOs below the line are considered to be more efficient.

The DNO's position on along the x-axis represents, effectively, the size or scale of that DNO but does not demonstrate any assessment of efficiency.

The DNO positioned furthest below the average line is the DNO considered to be at the frontier of efficiency.

In summary, the results show:

- Network design and engineering (**Figure 21**). These are the costs associated with designing the network in response to new or modified connections and asset replacement or network reinforcements. Outcome: SEPD at frontier and SHEPD 2nd most efficient.
- System mapping – cartographical (**Figure 22**). These are costs associated with mapping our networks. Outcome: SHEPD at frontier and SEPD 2nd most efficient.
- Call centre (**Figure 23**). These are costs associated with call centre provision. Outcome: SEPD 10th most efficient and SHEPD 11th most efficient. As can be seen from the graph below, both SHEPD and SEPD are both seen as being less efficient than the average DNO. We believe that this result is due to several contributory factors. Until 2012/13, both of our call centres were entirely based on people answering the phones rather than a call answering system in the first instance. This has had an adverse affect on our 'Customer Service' traffic light in the Distribution Annual report, and during the 2013/14 year we are bringing in a call answering system to address this.
- Vehicles and Transport (**Figure 24**). These are costs associated with the operational vehicles we use across our networks. Outcome: SEPD 3rd most efficient and SHEPD 4th most efficient.

Figure 37: Disaggregated benchmarking assessment 2010/11 and 2011/12, Network design and engineering

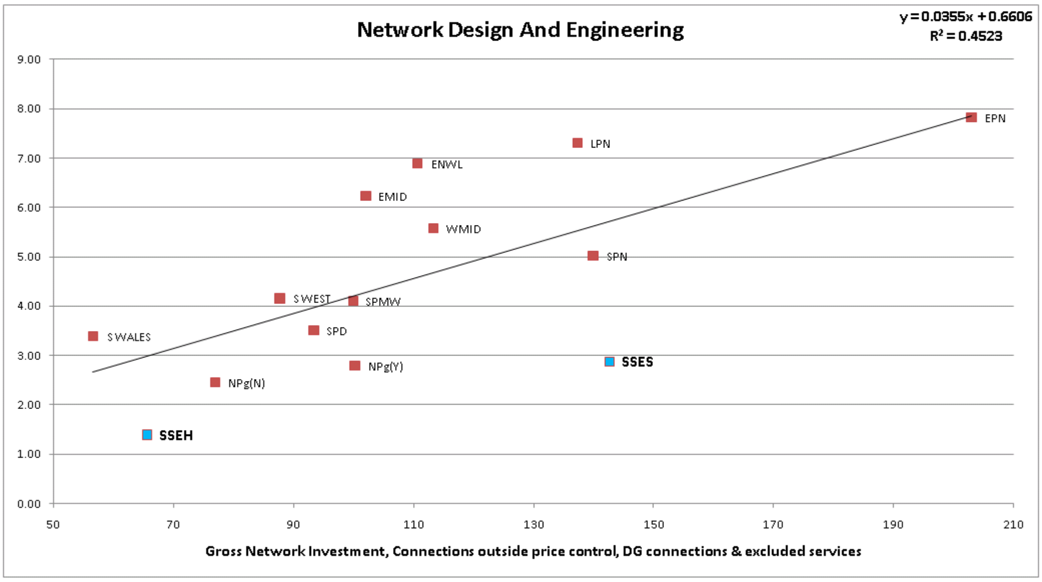


Figure 38: Disaggregated benchmarking assessment 2010/11 and 2011/12, System mapping - cartographical

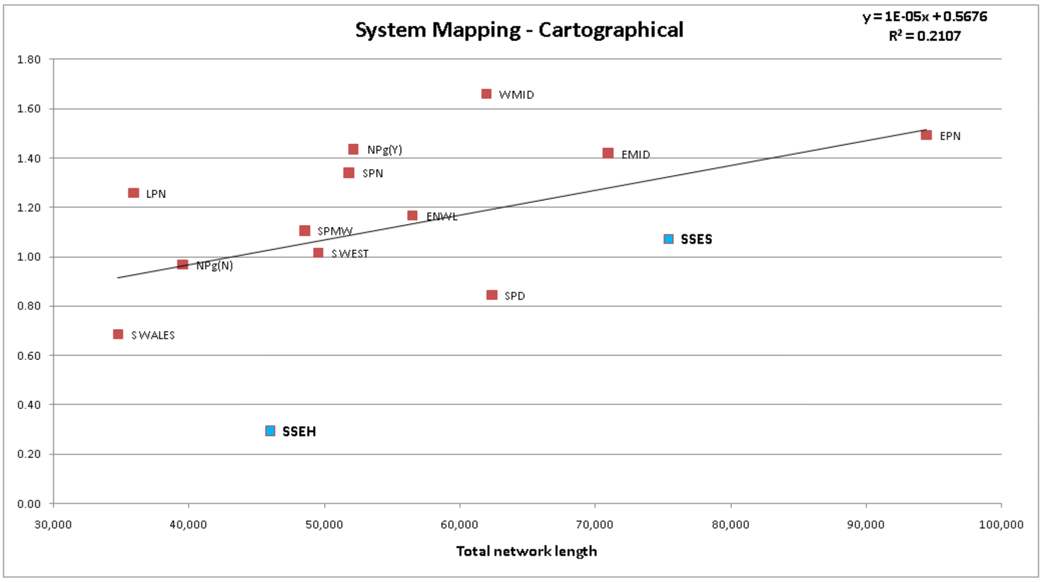


Figure 39: Disaggregated benchmarking assessment 2010/11 and 2011/12, Call Centre

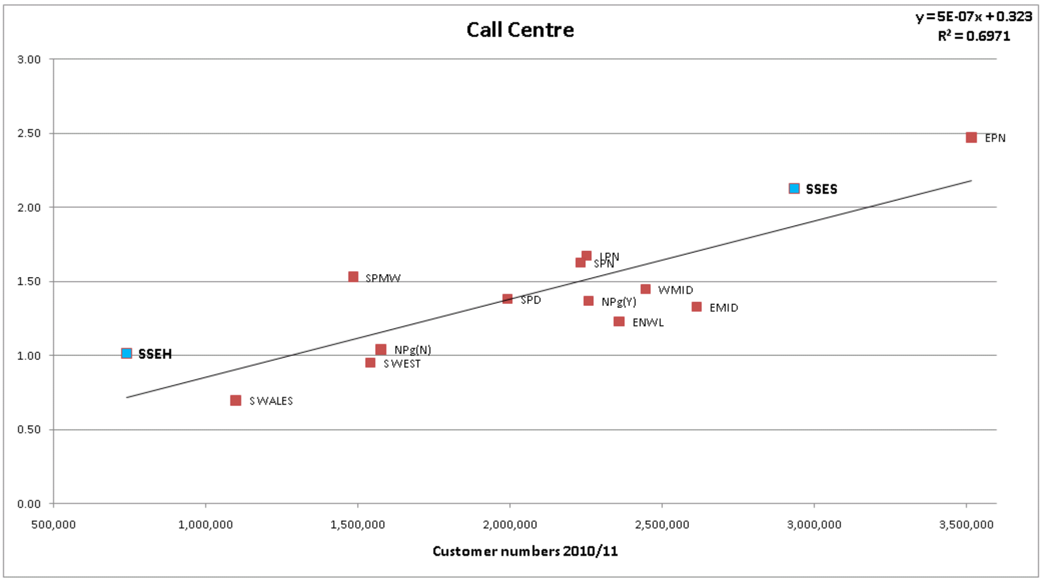
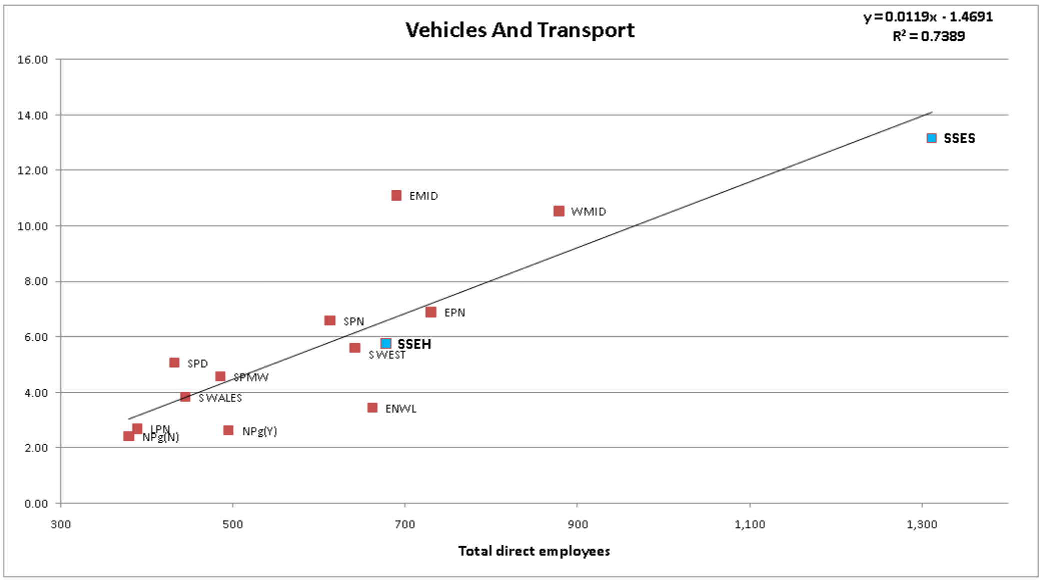


Figure 40: Disaggregated benchmarking assessment 2010/11 and 2011/12, Call Centre



Our business support costs are also assessed using the unadjusted Disaggregated Model.

The table in **Figure 41** sets out a summary of the unadjusted analysis of our business support costs:

Figure 41: Unadjusted regression analysis of business support costs 2010/11 and 2011/12

Activity	SHEPD	SEPD
HR & Non Operational Training	9	3
Finance & Regulation	2	1
CEO, etc.	6	1
IT & Telecoms	5	1
Property Mgmt	6	1

In summary, the results show:

- HR and non-operational training (**Figure 26**). These are the costs associated with provision of a Human Resources function and any training which is non-operational. Outcome: SEPD 3rd most efficient and SHEPD 9th most efficient.

  As can be seen from the graph below, SEPD is within the efficiency upper quartile for this activity while SHEPD is towards the less efficient DNO's using this cost driver. SHEPD efficiency ranking suffers from the relative scale of the company against the other DNO's. As can be seen from the graph, SHEPD has the second lowest spend in the industry on Total Labour costs, as one might expect given the size of SHEPD. There is a large element of fixed costs in a number of the Business Support costs categories, including HR and non-operational training. These fixed costs include training facilities and a core number of HR staff irrespective of total staff numbers.

- Finance (**Figure 27**). These are costs associated with provision of a Finance function. Outcome: SEPD at frontier and SHEPD 2nd most efficient.

- IT and Telecoms (**Figure 28**). These are costs associated with the provision of IT services and communications, including our Private Mobile Radio network. Outcome: SEPD 1st most efficient and SHEPD 5th most efficient.

Figure 42: Disaggregated benchmarking assessment 2010/11 and 2011/12, HR and Non Operational Training

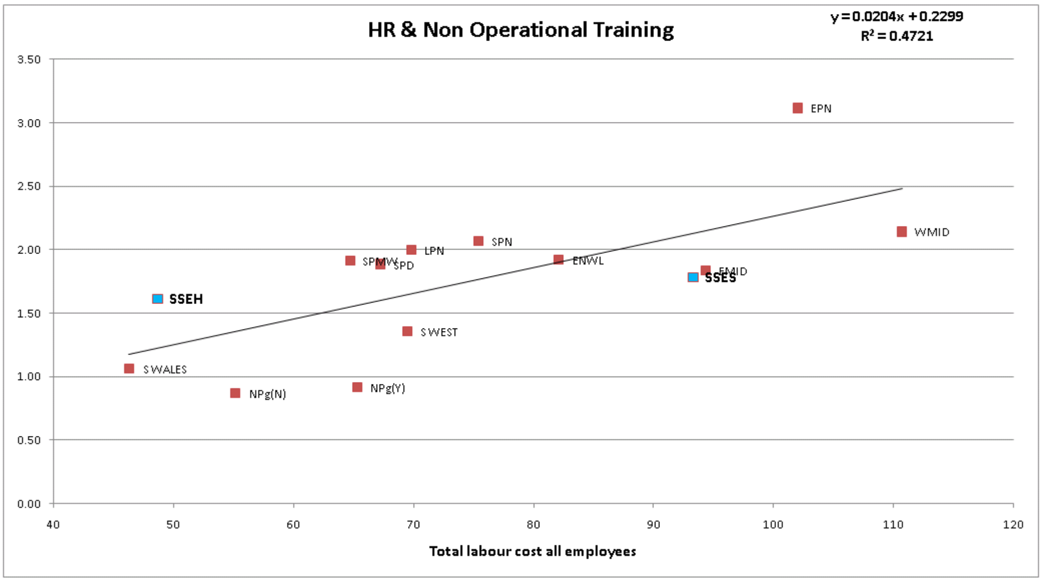


Figure 43: Disaggregated benchmarking assessment 2010/11 and 2011/12, Finance

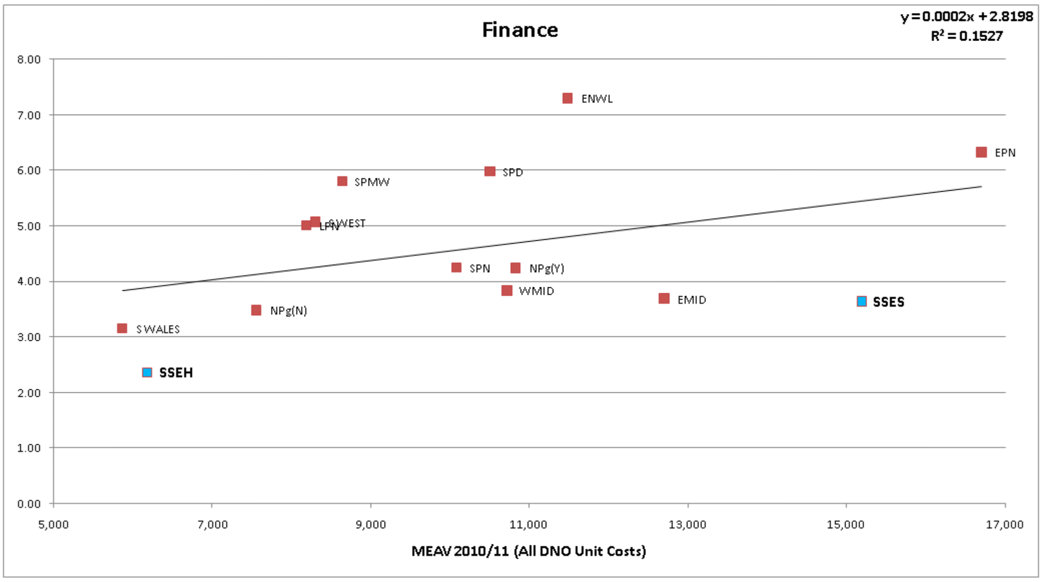
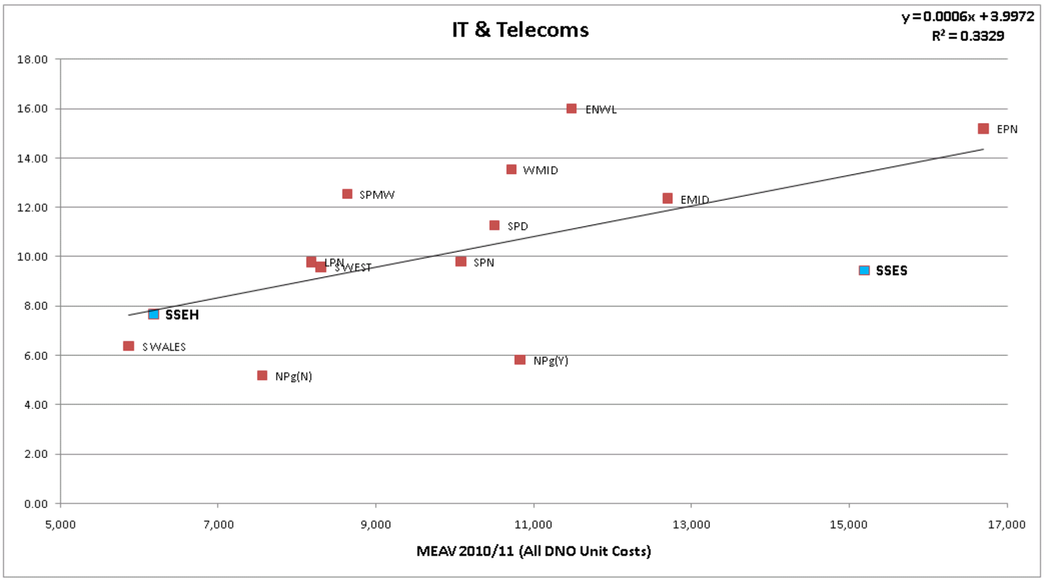


Figure 44: Disaggregated benchmarking assessment 2010/11 and 2011/12, IT and Telecoms



Outcome of disaggregated benchmarking assessment

Ofgem have stated that their intention is not to "cherry-pick" specific parts of the Disaggregated Model but rather to view the results in the round. Whilst we have demonstrated that SEPD and SHEPD perform, largely, within the upper quartile of efficiency across a range of specific costs and activities, we strongly support Ofgem's intention to consider the results in the round.

Furthermore, we support Ofgem's intention to consider whether there are regionally specific factors which impact on a DNO's costs. We have included our assessment of those specific costs for SHEPD in this paper, supported by our paper on regional factors

When considered in the round, and when the model is adjusted to take into account those costs which have a specific regional impact on SHEPD, it is clear that SEPD is the most efficient DNO in the country, closely followed by SHEPD as 2nd most efficient.

Overall benchmarking conclusion

Our analysis of the comparative efficiency models being developed for assessment of the RIIO-ED1 Business Plans shows:

- Totex benchmarking: SEPD 2nd most efficient, SHEPD as a clear outlier
- Disaggregated benchmarking: SEPD most efficient, SHEPD 2nd most efficient

Based on this analysis, we would argue that – as has been the case in previous price control review assessments – **SSEPD is the most efficient GB DNO**.

Absolute efficiency

We want to keep getting better and smarter – this way we can keep delivering value for money to our customers.

We have demonstrated in the previous section that we are at the forefront of efficiency when compared with the other DNOs. This is because we are always looking for ways to do things better and smarter – it's the way we do things.

By continuing to do things better and smarter during the RIIO-ED1 period, we can make a commitment to our customers to reduce our part of their electricity bill by 10% in 2015 and apply only inflationary increases thereafter. In other words, we are committing to give our customers more for less.

There are three key activities that will help us improve our efficiency during the RIIO-ED1 period:

- Smarter working practices

  During RIIO-ED1, as we have been doing for the past 15 years, we will continue to investigate and implement smarter working practices and we will share those practices with the other DNOs through our participation in industry organisations, such as the Energy Network Association.

- Innovative solutions

  We will trial and implement innovative solutions to the day to day challenges of network operation and investment, as set out in our Innovation Strategy.

- Prudent investment and expenditure

  We will maintain our focus on ensuring that all investment we undertake is done on a prudent and on a "need only" basis to deliver best value for customers. This will be reflected in the continuation of our extensive inspection, maintenance and refurbishment programme to ensure that we only refurbish or replace assets when it is absolutely necessary.

As we describe in this section, we have strong working practices in place to support these activities.

Efficiency is embedded in our organisation and culture

Efficiency is one of our six core values and it underpins everything we do.

"Efficiency – we keep things simple, do the work that adds value and avoid wasting money, materials, energy or time."

It also features strongly in our company goals (**Figure 29**).

"Be Smarter. Be the most efficient, responsive and innovative networks operator."

Figure 45: Be Smarter

To help achieve this goal, staff appraisals consider individual performance against our core values, including efficiency, with annual salary increases linked to the outcome of the appraisal. This both encourages and rewards efficient behaviour across all staff in our company.

We have also implemented a "Value for Money Taskforce" to bring additional focus into operational efficiency. This taskforce has delivered significant efficiency savings of around £3 million each year, over the last two years, and continues to support the business in driving efficiencies in many areas.

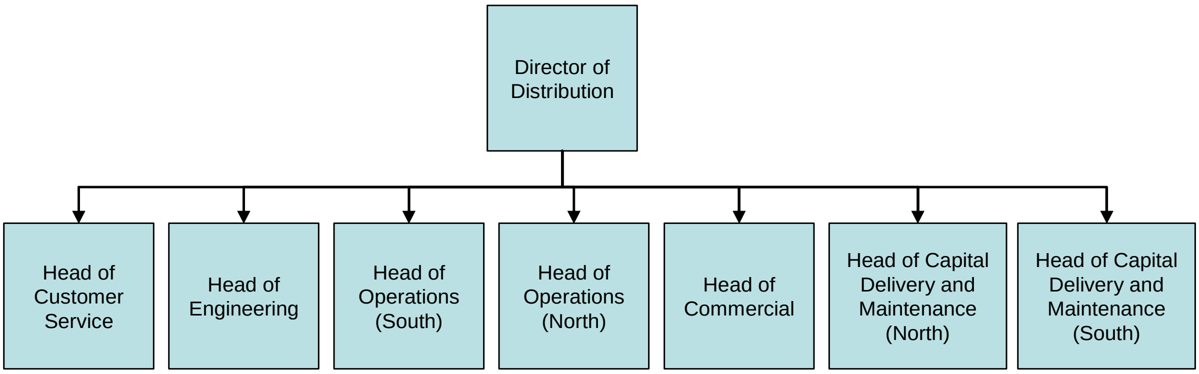
Different network locations, same approach to delivering efficient performance

Although our networks are geographically distant from one another, there is a single management team for both and each network is operated in the same way, with exactly the same emphasis on efficiency (**Figure 30**).

There are some regional differences in the way we operate and, hence, in absolute costs, which are largely due to specific factors affecting our north of Scotland network in isolation. For example, in remote areas in our north of Scotland network, there is extremely limited mobile phone reception. As a result, we are required to run a Private Mobile Radio (PMR) network to ensure that we can communicate with our field staff on the ground. The cost of doing this is significantly higher than using mobile phones but due to the geography and terrain, we have no choice of communication method. However, we remain convinced that, through our single management and operational model, both networks continue to operate at the frontier of efficiency.

This has been the way we have operated since SSE was formed in 1998, and we strongly believe that this is the optimum operating model for our business. This has resulted in the efficient and successful performance of both of our DNOs over the past 15 years.

Figure 46 SSEPD Management Team



Smarter working practices

Efficiency is embedded in our culture and organisation. We are always looking for ways to do things better and smarter – it's the way we do things.

During the RIIO-ED1 period we will continue to identify and implement smarter working practices and we will share those practices with the other DNOs so that customers across all networks may benefit from our best value approach.

A requirement to continually innovate and find smarter ways of working is built into the SSE Group cost control and annual budget setting process. As a minimum target each year, all operational and business support units within SSE are tasked with identifying operational efficiency savings of between 0.5% and 1% on like-for-like activities. These targets are embedded in our business units and reinforced during the annual budgetary process.

Each year a dedicated budgetary review process takes place for the Distribution business. The proposed distribution budget is presented by the Director of Distribution and is subject to a detailed review by the SSE plc Chief Executive and Finance Director. The budget is agreed following detailed discussions on the required outputs and potential smarter ways of working including 'spend to save'.

During the course of the year, quarterly reviews are undertaken by the Chief Executive and Finance Director to ensure budgetary targets and outputs are being achieved.

These efficiency savings have been incorporated into our Business Plan submission and there is a presumed 1% per annum productivity gain applied to all operational and business support costs for the RIIO-ED1 period (see **Error! Reference source not found.**).

There are numerous examples of where we have already implemented smarter working during the current price control period and we intend to these continue throughout the RIIO-ED1 period

Example: Monthly Risk and Opportunity meetings

It was recognised that our traditional style of governance did not lend itself to speedy decision making and flexibility. In order to ensure that we could make the most of opportunities as they arose, we updated our governance processes and introduced Risk and Opportunity meetings.

These meetings have been implemented to ensure that quick decisions can be made at an appropriate organisational level when risks or opportunities present themselves during network reinforcement and refurbishment projects. They are chaired by our Director of Distribution and the focus of the meeting is to deliver efficiencies during project delivery.

A recent example of the success of this arrangement is on our Bracknell – Ascot 33kV project, where we saved £1 million by identifying a potential efficiency opportunity and implementing the appropriate solution at an early stage. It was identified that the project would lend itself to the use of aluminium cable rather than copper and our flexible governance arrangements meant that we could quickly implement the change of cable whilst still ensuring appropriate sign-off.

Another example is where a project, which would normally be delivered through a Framework Agreement, was flagged as more appropriate to be delivered via a bespoke tender. Authorisation was provided quickly and the project was delivered for 25% less than originally set out in the Framework Agreement.

Example: Use of Hand Held Electric Pruner for tree cutting

We are now using hand held electric pruners for cutting trees that are in the vicinity of our power lines. The benefits include more accurate cuts to the tree and reduction in manual handling for staff, thereby completing the task quicker.

Example: In-sourcing activities

Over the last few years, we have reduced our use of external resource and in-sourced in a number of areas across our business. We have a policy to in-source activities wherever possible, in particular where the work is related to network operating costs. We believe that this is different from most other DNOs, and partly contributes to our greater comparative efficiency.

This policy gives us direct control over day to day activities that take place within our networks and avoids time consuming and costly discussion, negotiation and disputes with third party contractors. Wherever possible we undertake tree cutting, reinstatement and excavation activities with staff directly employed by SSEPD.

Examples of specific in-sourcing activities include:

West London Reinstatement Works

During early 2013, in the West London area of our southern network, we identified a particular area of reinstatement work which was routinely completed by contractors. We assessed our requirements for in-sourcing this reinstatement work which showed a strong cost-benefit with a forecast an efficiency saving of around £330k per annum. Consequently, we purchased a 7.5 tonne lorry and hired two skilled operatives.

Since in-sourcing this work in March 2013, we have realised a number of unexpected benefits: (a) our feedback from customers has improved as the control of this reinstatement work has been brought in-house and subsequently tightened; and (b) we have secured significant discounts from suppliers as we now directly purchase the materials required to complete the work.

Portsmouth high voltage (HV) Overlay Work

Following a review of our HV overlay work, we recognised that this is an area where we had used external contractors rather than internal resource. We identified a number of locations where we had internal staff with the correct skill set and matched these with the locations where we were most often using external contractors.

Our Portsmouth and Isle of Wight depots were chosen as a trial to in-source this work during the delivery of a 2km HV overlay in Southampton in January 2013. Where this work would normally have been contracted out, the Portsmouth team used qualified engineers from our Isle of Wight depot and successfully delivered the project in-house, ahead of schedule and substantially under budget. By taking this approach, we saved around £250k against using external resource.

Additionally, the Portsmouth team benefited from shared learning and the ability to tightly control delivery, thereby improving service to customers. We are working to roll out this model to other locations and further reduce the use of external resource.

Training programmes

We have identified areas where we require either additional skills or improved succession plans and have enhanced our training programmes to ensure that we can deliver on both areas from a pool of internal resource.

We have our own training schools on site and have developed an extensive suite of training programmes to ensure that our staff are not only trained in the technical aspects of the task but are also trained in “the way we do things”. This helps us ensure that all of our staff have a consistent focus on excellence and efficiency.

For example, we currently employ around 121 Technical Staff Trainees who undergo both on-the-job and external academic training. Once fully trained, these staff members will be deployed into key areas of the business as required. This type of internal training programme ensures that the trainees have the right skills for our business and become part of our culture at an early stage. We find that this pool of trainees demonstrate a strong loyalty to SSEPD which reduces staff turnover and in turn reduces our overheads.

Innovative solutions

There is a strong focus on innovation within our business, both on a network and corporate level. Along with smarter working practices to keep us at the frontier of efficiency, we work to deliver innovative solutions to meet the challenges of day-to-day operation of our network.

Our Innovation Strategy sets out our approach to innovation and describes how we expect to continue to be innovative throughout RIIO-ED1. Our strategy is supported by our Future Networks team who explore, assess and deliver innovative solutions across our distribution business.

From a wider, group perspective, SSE has a ‘Licence to Innovate’ scheme, which encourages innovation across all parts of our business. This scheme encourages our staff to bring forward ideas and assists them with the development and implementation of those innovative ideas across the business. It is supported by an Innovation Team who are tasked with helping turn ideas into reality.

The Licence to Innovate scheme has delivered around £14 million of cost savings during 2012/13 across our network businesses, along with many other ideas to improve the service we deliver to our customers. The scheme has fundamentally influenced the way we do things from the simple printing of documents to the way in which we identify and resolve faults on our network. Most importantly, it gives voice to everyone in our organisation who has an idea about how we could do things better.

Some of the most successful of our innovative and efficient solutions include:

Example: Polymer Paint

One of the most successful Licences to Innovate so far, within our network business, has been the introduction of polymer paint. This paint chemically binds the material it is applied to, strengthening and repairing surfaces which may normally need to be replaced. It is estimated that the use of this paint could increase the lifespan of the assets it is applied to by up to 10 years.

Example: Use of the Rock Drill

We have started to utilise rock drilling technology in the west coast of Scotland instead of the traditional blasting method. Benefits are increased safety as it removes the need for use of explosives and efficiency as the costs of use are lower. The technology has been proven elsewhere and had now been used on several of our sites with excellent results. Even in areas of very hard rock the drill coped easily.

<u>Example</u>: The Bidoyng

We have recently started to install a new feature on our Low Voltage (LV) network, called a “Bidoyng”. When there is a LV fault on our network, we would usually need to send an engineer to manually close the fault and restore customer supplies. However, this unusually named piece of equipment uses a secondary fuse to automatically close the fault, thereby more quickly restoring customer supplies.

Use of this feature reduces the length of time that customers are off supply but also avoids the cost of having to dispatch an engineer to manually resolve every LV fault. It allows us to focus on finding the fault location and resolving the underlying cause of the fault without having to spend time manually replacing a fuse.

Not only are we continuing the roll out of the Bidoyng across our network, but we have also identified an innovative enhancement to its design which will allow two-way communication with the unit. We have been working with the manufacturer to install software on the Bidoyng which will allow the unit to analyse the fault conditions that it has witnessed in order produce a predicted distance to the location of the fault. This data is then gathered and used in our future fault calculation models, allowing for more efficient identification of faults. Additionally, the two-way communication enables software updates to be installed on the unit remotely and whilst in service, further reducing the need for and cost of manual intervention.

<u>Example</u>: The Sniffer

We have introduced the “Sniffer” device, which enables engineers to pin-point the location of underground cable faults using a sensor which detects the gases emitted by a cable when it has failed.

Following a fault, engineers will use on-site information to narrow down the most likely locations that the cable may have failed along its route. Small holes are then drilled into the tarmac over the route of the cable at these most likely fault positions. A slim pencil-like sensor is then inserted into the drill hole to detect the presence of fault gases. We can use the data from the sensor to identify the location which has the highest level of fault gases and therefore the most likely location of the cable fault without having to excavate along the whole cable route.

The use of this tool has not only reduced the time it takes to identify the location of an underground cable fault, but it has also reduced the number of trial holes which are excavated in the highway. This reduces the time that customers are off supply and avoids costly excavation works by enabling us to efficiently locate the fault and take action only where required.

<u>Example:</u> 33kV Live Line Working

We have been investigating and trialling working live at higher voltages. This improves our customer service as we are be able to do more work live and therefore not have to put their power off. It also improves efficiency as it removes the need for mobile generation on power outages, which can be quite significant.

<u>Example</u>: Use of thermal imaging devices

Another innovative solution we have deployed on our network is the use of thermal imaging devices to detect the presence of faults. When an electrical fault occurs, heat is generated at the point of failure. A thermal imaging device will often detect this heat if it is used shortly after the fault occurs.

We use the thermal imaging device to assess the location of underground cable faults, with particular success in the winter. However, we also use the device to detect transient faults on our High Voltage (HV) overhead lines, where the circuit may have faulted but then quickly been restored with no ongoing fault obvious. Faulty insulators look normal to the naked eye but can be seen to glow when using the thermal imaging device. This allows our engineers to identify the source of the fault and take efficient and targeted action.

<u>Example</u>: SatNav systems used to assign work

We are now routinely using SatNav systems to assign work to our engineers in the field and identify which engineers are the closest to a fault.

The use of SatNav enables the correct information to be efficiently transmitted and received without the engineer having to return to the office. Also, by identifying which engineers are closest to a fault, we can reduce the length of time that customers are off supply and save on fuel costs from unnecessary journeys.

The use of this system has brought another benefit in shortening the length of time for initial contact on general enquiries. We are able to identify the location of our staff in real time and match this up to the location of a general enquiry call to make best use of available resource. We aim to reduce the time to make local contact with our customers with general enquiries to less than two days.

Prudent investment and expenditure

All our activities and investment plans are based on ensuring that our work is efficient and that we only undertake work where there is a strong need to do so.

Constantly assessing how we do things and adopting best practice is critical to maintaining year-on-year productivity gains.

Four areas in particular are focused on within SSEPD:

- Options for replacement or reinforcement
- Rigorous investment management process
- Ensure value for money
- Efficient business support functions

Evolution of best practice in the first two of these, adopted by SSEPD during 2010, resulted in reductions of up to 5% in our capital cost base. These benefits have been shared with our customers through the DPCR5 efficiency sharing mechanism.

Options for replacement or reinforcement

When it comes to looking after our assets, we make sure that we have explored all alternatives before we decide to replace an asset.

We always consider whether there are operational alternatives to asset replacement. Many of our innovation solutions are about operating our network in an innovative way in order to avoid the cost of replacing an asset. For example, we have introduced an Active Network Management system in Orkney to provide more capacity on the island. Distributed generation is extremely popular on Orkney, given the plentiful renewable resources, and, as a result, the capacity of the distribution network for new renewable generators was used up with more generators still keen to connect. Rather than simply replace expensive subsea cables and onshore substations when the distribution grid became full, we introduced a system which would allow us to closely manage generation and demand, allowing renewable generators to connect and generate when they would normally not have been able to.

This operational approach to allowing more grid capacity was a more efficient alternative to traditional asset replacement.

Additionally, we have an extensive programme of asset refurbishment which allows us to extend the life of assets that may ordinarily need to be replaced. However, although our preference is to refurbish rather than replace, the age of our network is in line with the GB average. We ensure that we obtain maximum benefit from our network assets through ongoing inspection and maintenance but when it is appropriate, we ensure that the assets are replaced. This ensures that our customers get a reliable service for the least cost.

Rigorous investment management process

When it becomes imperative that assets are replaced, or that we need to make any investment on our network, we ensure that our expenditure is as efficient as possible.

We have a robust process for managing our major network investments, which was introduced during this current price control period, DPCR5. The process, as illustrated in **Figure 31** centres around a Commitment-based Management (CbM) approach which ensures that all of the teams involved in the delivery of network investment are committed to efficient outcomes.

Each investment project is owned by an Investment Manager. The Investment Manager is effectively the planning engineer and he agrees the exact project scope in detail with the project delivery team. Each party makes personal commitments on delivery. These commitments are tested throughout the process to ensure that the project is on target for efficient delivery, as illustrated in **Figure 48**.

Throughout the project there are regular reviews and issues are discussed at the regular Risk and Opportunities Meetings (**page 83**). These ensure that progress on delivery dates and target costs are achieved and that there is no project scope creep.

The delivery framework includes a step by step approach which has strong governance and scrutiny at a number of critical points. This ensures that a close focus on efficient delivery is maintained at all stages. Additionally, the improvements to the governance process allows for greater flexibility whilst ensuring that appropriate sign off is achieved at each stage of the project.

This process has ensured that there are very close working relationships between our project teams and that a “silo mentality” does not arise. It has allowed us to streamline the Engineering Design and Project management activities within our networks and, as a consequence, we now have a smaller, tightly-knit team and are able to deliver projects with in-house staff, rather than relying on external resource. This process will continue to evolve, improve and deliver value throughout the RIIO-ED1 period.

Figure 47: SSEPD Investment Management Process

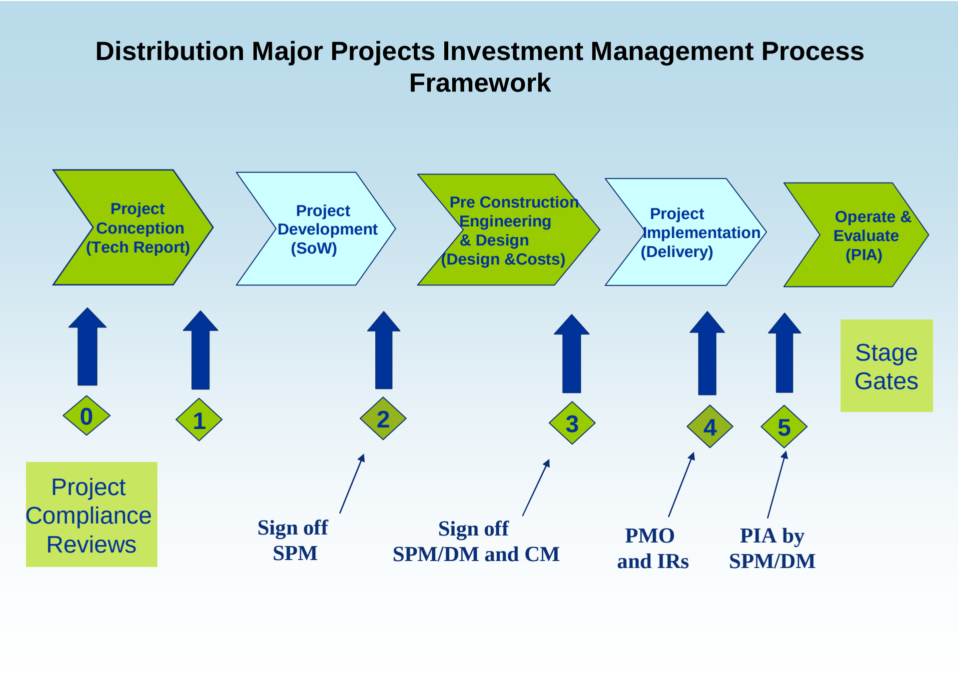
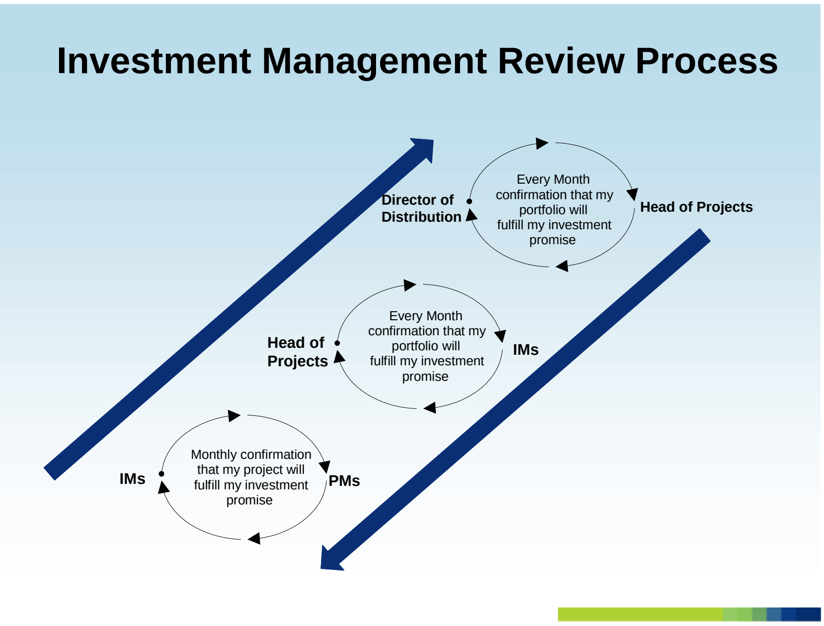


Figure 48 Investment Management Review Process



Ensure value for money

A key part of the delivery of network investment is the procurement of goods and services. We have robust processes in place to ensure that what we buy delivers value for money for our customers.

There are a number of processes in place to ensure that value for money is delivered through our procurement activities. Our specialist procurement team lead on the development and governance of these processes and are responsible for any purchases greater than £10,000. They ensure that any regulations relating to utility procurement are complied with and that goods and services are procured efficiently across the business. Our approach is aligned with procurement best practice.

<u>Procurement of goods or services >£10,000</u>

Any procurement of goods or services greater than £10,000 is completed by the procurement team, in conjunction with our network project delivery teams. There is a clear process for this, which is detailed in our internal Procurement Manual and subsidiary documents.

In summary:

- The process starts with the selection of potential tenderers, a sufficient number of which are required to ensure that the procurement process can be competitive.
- Once the list has been compiled, supplier pre-qualification and selection processes are completed to ensure that the activity complies with the EU Procurement Regulations. Although this compliance requirement is only mandatory where the goods or services to be procured are greater than £347,000, our standard approach is to complete these pre-qualification processes for all contracts over £10,000 to ensure that the outcome is as competitive and market-driven as possible.
- A number of standard governance arrangements are prepared and adopted throughout the procurement process including the development and authorisation of a Contract Empowerment Plan and a Contract Strategy. These documents ensure that any risks or uncertainties associated with the procurement contract are highlighted and mitigated efficiently at an early stage in the process. This minimises costly compensation events or contract disputes later on.
- Once the tender document and associated scope have been published and responses have been received from tenderers, the evaluation process can commence.
- Tender responses are evaluated across a range of criteria including safety performance, price, programme, capability and commercial conditions. This objective evaluation process allows us to select the most efficient response from a whole life cost perspective rather than just a simple focus on the cheapest price. It enables us to assess when a higher initial cost will deliver long term savings and when the least expensive response is the most appropriate.
- During the evaluation process, negotiations with all suppliers will take place and continue until all options are fully explored and any amendments to prices or other conditions have been fully evaluated. This

negotiation allows us to drive improvements in the initial contract offer with a range of suppliers to ensure maximum competitive benefit.

- In some circumstances, we implement Framework Agreements which allow us to develop a long term relationship with the supplier. The Framework Agreement is tendered in first instance and once in place, we continue to market test the prices to ensure that they remain competitive. The primary source of this market testing is through our Procurement department's benchmarking activities. We currently have Framework Agreements in place for the procurement of substation assets, overhead lines and some underground cables.

Procurement benchmarking activities

To ensure that the prices returned by tenderers, and those embedded in Framework Agreements, are market tested, our Procurement Department use independent benchmarking assessments.

We employ Purchasing Index Ltd, an independent benchmarking firm, to provide up to date market data on costs. We are required to submit prices for a large "basket of goods" on a regular basis, which are then held in a central database, along with the same information from another eight DNOs. This information has been collated by Purchasing Index Ltd since the mid-1990s and includes products such as transformers, switchgear and cables. It also covers services such as vegetation control, substation maintenance and cable laying, along with some business support costs like office supplies, Personal Protective Equipment (PPE) and vehicle costs. We then have access to this database so that we can compare our costs to those across the rest of the market.

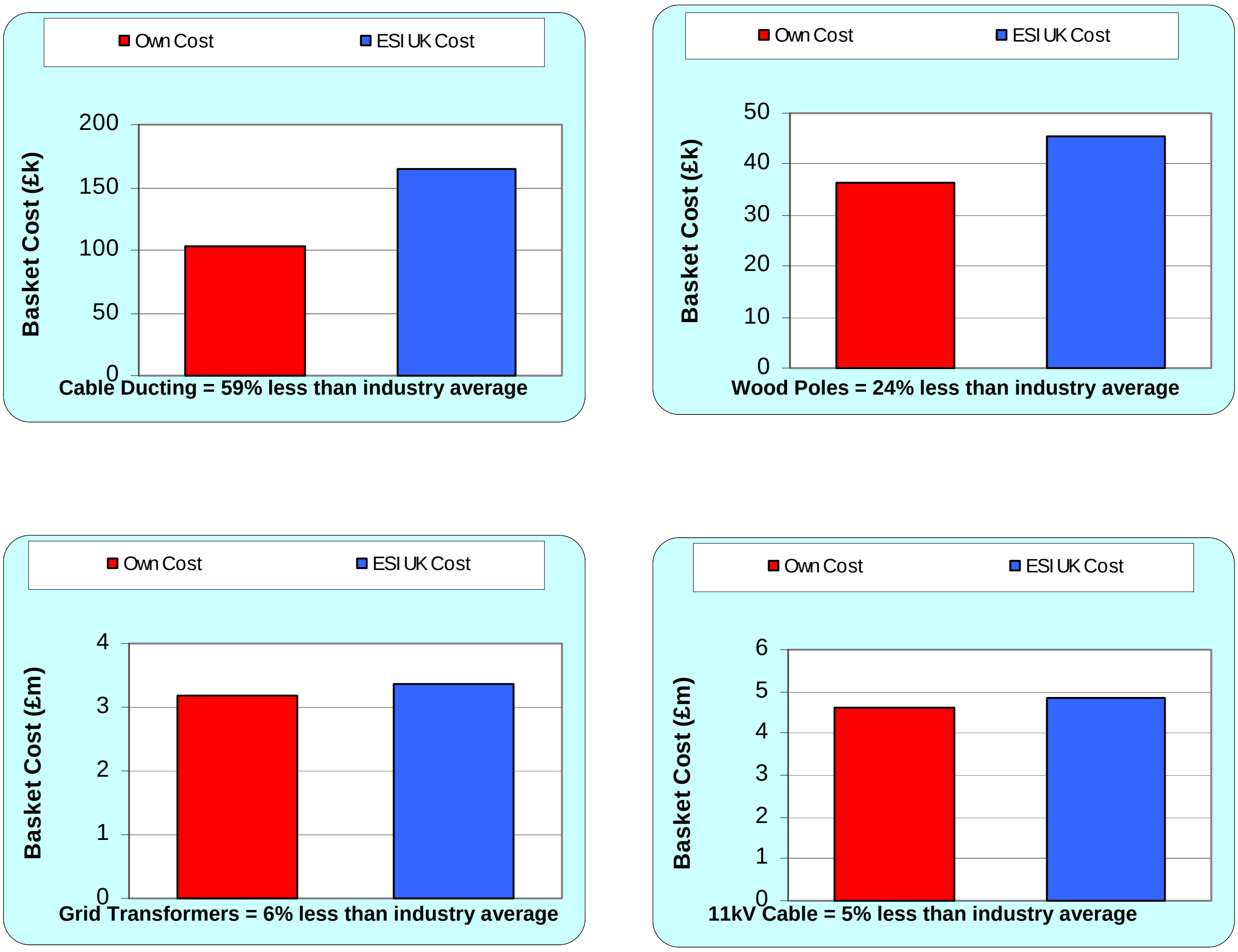
This process allows us to ensure that the prices that we procure goods or services at are as competitive as possible on an ongoing basis.

Our analysis from Purchasing Index Ltd in March 2013 demonstrates that we are procuring a number of items at a significantly lower cost than the industry average (**Figure 33**).

The overall March 2013 analysis demonstrates that for the majority of the items in the "basket of goods", we are procuring items 7.8% cheaper than the industry average. This represents an equivalent saving of almost £2 million in that month alone.

Where the benchmarking results suggest that we are not procuring at a significantly lower cost than industry average, our Procurement department set Category Savings Targets and plans are developed and implemented to drive down procurement costs in that area.

Figure 49: Purchasing Index Ltd benchmarking assessment



Efficient business support functions

The vast majority of our DNOs' closely associated and business support indirect costs are undertaken by our own directly employed staff. 80% of these costs for SHEPD and 81% for SEPD (excluding insurance and wayleave costs), in 2012/13, were provided by in house resource.

It is our strong belief that activities such as engineering design and project management are best delivered by the use of internal resource rather than third party contractors. This delivery mechanism allows the SSEPD efficiency culture and values to be embedded within the front line staff. This ensures there is a strong affinity from delivery staff to the SSE set of values.

As mentioned above, in 2010 we introduced a commitment-based investment management delivery framework to the design, planning and delivery of our major network reinforcements. This approach ensured that all projects were owned by an investment manager throughout the whole project lifecycle and enabled flexibility in the delivery process to maximise efficiency.

The majority of our network business support costs are provided to both our DNO's via SSE Services plc. This is based on the long standing SSE Group business model where all corporate services are centrally managed and these functions provide services and support across all SSE business units. As well as providing support to our two DNO's, services are also provided to other SSE business areas such as generation, supply, transmission and storage. We believe that this business structure has contributed to our efficient historic performance in this area.

SSE plc has established centres of excellence in functions such as finance, human resources, regulation, corporate communications, procurement and IT. Many of the corporate functions have business specific facing teams providing services to the DNO's but the senior management and strategic direction of these functions is managed centrally. This avoids the need for a large number of senior staff to be appointed solely to cover DNO activities. For example, SSEPD does not have a Director of HR. A senior HR professional provides a service to our network business and policy, strategic direction and ongoing management is undertaken centrally.

Other areas such as treasury, tax, internal audit, company secretarial and investor relations do not have dedicated business specific staff but provide a full range of services on behalf of our network business and other areas.

All of these services are provided to the DNO at cost to SSE Services and the allocation methodology is based on a number of different recharge bases within the SSE corporate recharge model.

This centralised approach allows SSEPD to benefit from economies of scale and therefore allows us to deliver business support services at an efficient level. In addition, this operating structure allows the operational management of the network business to fully focus on the delivery of regulatory outputs and operational targets rather than becoming distracted with corporate services issues.

All of the group services functions are subject to the same procurement rules outlined in the section above and this will ensure that the services acquired by the group functions are obtained at the lowest cost possible.

Conclusion

We have always had a strong focus on efficiency which is firmly embedded in our organisation and culture. Through smarter working practices, innovation and prudent investment, we have been at the forefront of efficient performance for the last 15 years. We will continue to develop these practices and behaviours throughout the RIIO ED1 period and will ensure that we remain at the forefront of efficiency, delivering best value for customers.