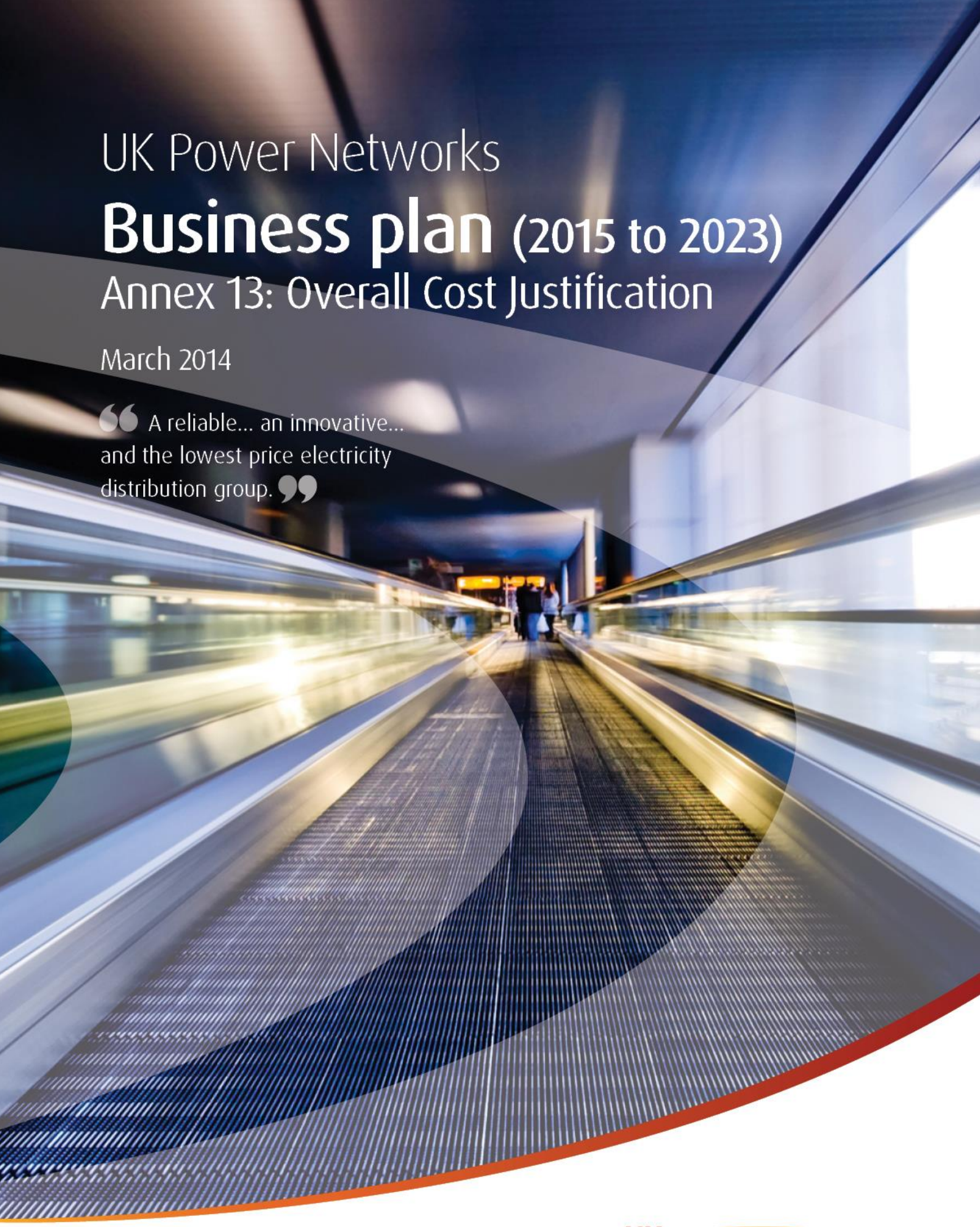

UK Power Networks

Business plan (2015 to 2023)

Annex 13: Overall Cost Justification

March 2014

"A reliable... an innovative... and the lowest price electricity distribution group."

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Delivering your electricity

Contents

This annex has been updated to reflect UK Power Networks' March 2014 business plan. We have a tracked change version for the purpose of informing Ofgem of all revisions to the July 2013 business plan, should this be required.

1 Executive Summary

1.1 Development of the cost assessment process

As part of the business plan, published by UK Power Networks in July 2013, Annex 13 provided a justification of the expenditure we had proposed. This included a discussion of the various cost assessment tools and methods that were available, together with the results of benchmarking of the plan, based on a UK Power Networks view of how this assessment might be conducted.

In November 2013, Ofgem published its 'fast-track' assessment of the DNO business plans including the cost benchmarking model that it had applied.

The decision to fast-track one or more companies, and then the setting of cost allowances for the remaining companies are distinctly different tasks, and hence following the fast-track assessment, Ofgem has been considering how it might wish to modify its benchmarking models for use with the business plan resubmissions. All of the DNOs were invited to contribute to this process.

This document provides a replacement for the previous Annex 13. It has been updated to reflect what we now know about the cost assessment process which Ofgem will be undertaking. The emphasis of this document is different, focusing less on a discussion of the tools and methods that are available and why UK Power Networks has selected one rather than another, and instead applies a modified version of the fast-track assessment model to our revised plan.

A presentation of the results is then provided, together with appropriate explanations to support them.

1.2 An overview of the cost assessment model

We support the use of a toolkit of cost assessment methods and models, to assess our relative efficiency amongst the UK DNOs, given the outputs we have proposed to deliver. We also recognise the inherent limitations of benchmarking and of the comparability of data and note that benchmarking needs to be tailored to meet specific regulatory applications.

In line with Ofgem's approach to date, we have assessed the efficiency of our RIIO-ED1 expenditure forecasts using three primary models, as follows, and then brought these results together into an overall assessment:

Totex model (macro CSV): a statistical model that considers total expenditure (capital and operating expenditures together) in the context of a number of service characteristics, such as the number of customers and units distributed through the network. This model draws on work which was originally commissioned by UK Power Networks in conjunction with another DNO group and later adopted by Ofgem.

Totex model ('bottom-up'): a statistical model that considers total expenditure (capex and opex) but instead of using service characteristics, employs the major activity-level measures, such as the volume of faults, network scale etc., as the cost drivers.

Disaggregated model: This offers an alternative perspective to those provided by the Totex models. It assesses each of the activities, for which a DNO is expected to report actual costs and volumes, individually and produces a detailed assessment of the efficiency of each. These assessments are then aggregated and an overall benchmark applied.

As the disaggregated approach considers a diverse range of activities, equally this requires a number of different tools and techniques to be used, as follows:

- **Regression models:** these are statistical models which attempt to define a relationship between the costs which have been reported and the drivers of those costs. This relationship is then used to estimate an efficient level of costs going forward, based on the forecast volumes.
- **Unit cost modelling:** The principle of the unit cost approach is to compare the cost reported by the companies to one 'unit' of a product or service. Whilst this approach is typically associated with manufacturing environments, there are activities within the cost base that are particularly suited to this form of analysis. Where it can be applied, it provides simple and readily understandable outcomes.
- **Project specific assessment:** Some projects and programmes of work are, by their very nature, highly individual and hence it is very difficult to apply simple measures, or even statistical techniques, to assess their efficiency. In such circumstances, these should be assessed on an individual basis, and hence UK Power Networks has developed specific project justifications in support of our expenditure proposals. Links to the corresponding documentation are provided as appropriate within this annex.

Over and above the analysis which Ofgem will conduct, we have provided further supporting information which underlines the efficiency of certain proposed expenditure as follows:

- **Cost Benefit Analysis (CBA):** UK Power Networks has used cost benefit analysis to justify projects against Ofgem agreed criteria. It is most appropriate for use in the areas of network replacement, fluid filled cable replacement, asset refurbishment and quality of supply expenditure, and has been conducted as a supplement to the detailed justification of such projects or programmes. The detailed outcomes can be found in Annex 13c: Cost Benefit Analysis
- **External benchmark review:** UK Power Networks commissioned external consultants to review and assess the efficiency of IT and property costs. We choose to use specialist consultants in these two areas as both IT and property costs are difficult to benchmark as network companies have divergent asset ownership and operational procedures. We have included the two final reports from our consultants as additional information to our business plan submission. They can be found in:
- Benchmarking report on UKPN IT Services
- Benchmarking report on UKPN Property Management

It is noted that, although UK Power Networks uses consistent cost allocation methodologies and benchmarking drivers, over time EPN has performed worse in Ofgem benchmarking when compared with LPN and SPN. As this was a feature that was also observed in the DPCR5 price control, we commissioned Professor Andrew Chesher, Professor of Economics at University College London to review these outcomes.

He observed that EPN's network had two very diverse and distinct geographical and urban areas, a dense urban area in the north of London and a sparse rural area in the north and east of East Anglia, and concluded that this would result in difficulties in finding individual benchmarking drivers that reflect the overall nature of EPNs network. UK Power Networks shared these results with Ofgem and has included his final report (EPN Benchmarking: Potential implications of scale effects) as part of the business plan submission.

- We have been mindful of this in making modifications to Ofgem's assessment model and can report that we now achieve a more consistent set of results across our three DNOs, for those activities which we would expect to.

1.3 Well justified regional cost adjustments

The costs of operating electricity distribution networks vary across Great Britain, including within our three network areas. Our London and, to a lesser degree, South East networks (LPN and SPN) face higher costs than our EPN network, principally due to the challenging operating environment of a super-urban region, such as London, and the higher labour costs in this part of the UK.

We have adjusted the unit costs underpinning the LPN and SPN RIIO-ED1 expenditure forecasts to reflect the regional cost differences that result from delivering our output commitments to customers served by these Networks.

These regional differences are costs incurred by our networks that are not consistent with cost incurred by our own EPN network, or other DNOs, and also are outside of management control. These additional costs must be recognised when drawing comparisons within the industry.

Key areas of cost differences are set out in Table 1 below, together with estimates of their impact on UK Power Networks.

Table 1 Regional cost factors

Area of cost	Commentary	"London Factor" Cost (per annum 12/13)	SPN cost Factor (per annum 12/13)
Central London Network Strategy	Additional costs of providing the enhanced service demanded by customers in Central London	11.2	0
Transport & Travelling	Congestion charges, parking and site access. Importantly recent changes to legislation relating to streetworks has increased these costs significantly	0.6	0
Excavations	Accessing underground cable networks in high density urban areas, installing cables in footpaths and roads in which there is very little room left due to existing plant and equipment and environmental restrictions on streetworks	2.6	1.0
Operations	Scheduling work, accessing sites, and gaining consent from multiple interested parties such as property owners and local authorities	8.4	5.5
Labour	Higher labour rates and allowances	4.1	2.0
Security	Higher network asset security requirements and access to assets	1.8	0.5
Properties	Purchasing and accessing higher cost land and buildings	0.5	0.2
Contractors	Higher contracted labour rates (due to shortage of skilled labour)	2.9	1.5
Tunnels	Building tunnels for underground cables	2.2	0
Total:		34.3	10.7

Unquantifiable items

The following items can also lead to higher expenditure, but have not been quantified:

- Delays to jobs due to environmental restrictions by Local Authorities i.e. noise, dust, vibration, exhaust fumes, water etc.
- Delays to jobs due to the discovery of archaeological artefacts in City of London etc.

Mitigations and innovation

We have identified the following innovation initiatives and other methods that can mitigate the increased expenditure:

- New technology adopted for oil filled cable fault location: PFT training equipment
- Developing alternative technology to cable freezing but using non-intrusive Cable heating technology
- Engaging PCN to challenge all parking fines
- Major event planner to chart all major events in all regions that may affect supplies or our reputation
- Adopt shift working to carry out streetworks outside "normal" working hours to offset the high charges imposed by Lane Rental charges.
- Introduction of 24x7 shift working to improve the customer service in the Inner enhanced interconnected area of Westminster and The City of London

Our regional costs adjustments

In order to reflect all the above factors into our cost allowances, we have applied the same top down approach applied by Ofgem in its recent gas distribution determination. This results in the regional cost differences as shown in Table 2 below. This approach was chosen as it provides a straightforward, robust and transparent approach for calculating regional cost differences.

Table 2 Regional cost differences reflected in LPN's and SPN's 2015 to 2023 expenditure forecasts

	LPN - £m per annum	% of annual expenditure	SPN - £million per annum	% of annual expenditure
Replacement	6.7	22	3.5	10
Reinforcement	3.1	10	1.2	5
Civils	1.1	3	0.3	5
Operational IT&T	0.9	3	0	0
Faults	6.1	20	2.5	11
ONIs	0.3	1	0	0
I&M	4.0	13	0.8	9
Closely associated indirects	8.3	27	2.2	4
Total costs	30.2		10.5	

EPN's expenditure forecasts have not been adjusted for regional cost differences because the lower contract and labour costs in the East of England offset costs arising from the dense urban environment which characterises ENPs distribution area.

Further detail of the precise activities that are affected by regional factors, together with a fully-itemised allocation of those costs to cost categories are provided in Annex 13a: Regional Cost Justification.

1.4 Efficient modelled outcomes.

In the July 2013 version of this annex, we modelled a set of efficiency scores for the DPCR5 period, which are summarised in Table 3 below. Furthermore, UK Power Networks has employed specialist consultants to review our delivery model and resulting costs in areas where they appear inefficient. This was primarily focused on direct costs and business support.

This work showed that, over the period, UK Power Networks has demonstrated a marked improvement in its cost efficiency.

Table 3 Efficiency of our actual and forecast expenditure in DPCR5

Cost category	Efficiency score based on 5 years DPCR5 actuals and forecasts (2010/11 and 2014/15) (less than 100% is better than assessed frontier)		
	EPN	LPN	SPN
TOTEX model	96%	97%	95%
Capex core (e.g. replacement)	104%	106%	98%
Capex non-core (e.g. environment)	Project specific benchmark or CBA	Project specific benchmark or CBA	Project specific benchmark or CBA
Civils	Bottom up analysis	Bottom up analysis	Bottom up analysis
Network operating costs (NOC)	113%	105%	94%
Closely associated indirects (CAI)	104%	108%	102%
Business support	120%	108%	97%
IT and Property	External Benchmark	External Benchmark	External Benchmark

(Note: this table has been colour-coded on the following basis – Green: <100%, Amber: >100% and <105%, Red: >105%)

We have applied the Ofgem assessment model, suitably modified, to assess the efficiency of our RIIO-ED1 business plan, and this is shown in Table 4 below.

Table 4 Efficiency of our expenditure in RIIO-ED1.

Cost category	Expenditure change required to meet efficiency frontier (a positive value denotes a forecast which already benchmarks as efficient)		
	EPN	LPN	SPN
Combined assessment	-2%	-6%	-1%
Totex (macro)	+2%	+4%	0%
Totex (bottom-up)	-1%	-9%	-3%
Totex (sum of below categories)	-1%	-6%	+1%
Load-related capex	+11%	+9%	+12%
Non-load related capex	-12%	-31%	-9%
Other network capex	-19%	-15%	+5%
Network operating costs (NOC)	+2%	-1%	+5%
Closely associated indirects (CAI) and Smart Metering	+5%	-4%	+2%
Business support, Op IT&T and non-op capex	-5%	-7%	-5%
	NB Business Support benchmarks as efficient, supported by external review		

The values stated in Table 4 show the overall change in expenditure required to hit the efficiency frontier, which could be positive or negative. For example, the submitted Network Operating Costs in LPN need to be reduced by 1% to be considered efficient, whereas in EPN, the submitted costs are already 2% better than the benchmark costs.

In respect of Ofgem's combined assessment which brings together the outcomes of the three models, UK Power Networks' three DNOs are ranked as follows, out of 14 DNOs:

- EPN – 5th
- LPN – 9th
- SPN – 3rd

On a group basis, UK Power Networks ranks 2nd out of the 6 ownership groups.

Some spend categories benchmark as "amber" or "red" for individual networks; however when the impact of the written justifications is factored into the output of the assessment model, both EPN and SPN will be ranked efficient.

In the case of LPN, the additional justifications will close a substantial portion of the efficiency gap, with the remainder being accounted for through appropriate regional cost adjustment and consideration of the central London Network strategy. We believe that this reflects inevitable simplifying assumptions used in the benchmarking process which are averaged out at the overall totex benchmark level.

The revised assessed bottom up inefficiency gap is reduced to 1.8% of total expenditure and is shown in Table 5.

This is composed of a volume reduction of 3.7% with an increase in costs (i.e. efficient) of 1.9%. It is recognised that this assessment will change as other slow-tracked companies revised ED1 business plans and Ofgem improve their benchmark model for slow-track assessment. However, it is useful to identify where the assessment model still shows that UK Power networks' plan requires additional justification. The main remaining areas of negative variance are

- Non load CAPEX for all three DNOs (-£218 million). UK Power Networks' has included improved volume justification in its asset stewardship reports for all non-load expenditure together with a significant expansion of its cost benefit analysis to cover 65% of its expenditure. Additional justification has also

been provided for increased central London CAPEX of £30 million in our improved regional cost justification.

- Other CAPEX for EPN and LPN (-£37 million). UK Power Networks' has provided additional justification for its proposed ED1 BT21CN expenditure, showing that UK Power Networks will be ahead of its original DPCR5 at the end of 14/15 plan for both volume delivered and cost efficiency. There is a recognition that there is an increase in costs in this category but this is as a result of the mix of projects to be delivered in ED1. Additional justification for UK Power Networks' civil expenditure is also provided in the Civils condition ASR. This expenditure is also supported by additional positive CBAs in ED1.
- Non-operational expenditure (-£55 million). UK Power Networks has provided further justification of the increase in expenditure in ED1 for the replacement of its RTUs as they come to the end of their useful lives. This is believed to be unique to UK Power Networks DNOs. UK Power Networks has also resubmitted its original external justification for its proposed property and IT capital expenditure in ED1. This justification is also relevant to property and IT business support expenditure.

Table 5 Revised benchmarking based on UK Power Networks' adjustments to Ofgem's Model

£m		Totex Submitted	Totex adjustment	Volume adjustment	Cost adjustment
EPN	Load CAPEX	+496.2	+52.7	-163.8	+216.5
	Non load CAPEX	+579.1	-71.3	-38.3	-33.0
	Other CAPEX	+161.1	-29.9	-8.9	-21.1
	Network Operation costs	+606.8	+15.0	+4.7	+10.2
	CAI & smart-metering	+556.9	+26.7	+0.0	+26.7
	Business support, Op IT&T and non Op CAPEX	+379.1	-19.7	+0.0	-19.7
	Total	+2779.5	-26.6	-206.2	+179.6
LPN	Load CAPEX	+531.9	49.3	+49.1	+0.2
	Non load CAPEX	+359.8	-111.3	-58.4	-52.9
	Other CAPEX	+80.8	-11.8	-14.1	+2.2
	Network Operation costs	+330.4	-3.3	+5.5	-8.8
	CAI & smart-metering	+369.4	-15.9	+0.0	-15.9
	Business support, Op IT&T and non Op CAPEX	+288.5	-20.1	+0.0	-20.1
	Total	+1960.8	-113.1	-17.9	-95.2
SPN	Load CAPEX	+322.6	+37.8	0.8	+37.0
	Non load CAPEX	+380.4	-35.3	-30.5	-4.8
	Other CAPEX	+99.4	+4.7	-1.6	+6.3
	Network Operation costs	+366.9	+18.4	+11.5	+6.9
	CAI & smart-metering	+409.3	+8.5	+0.0	+8.5
	Business support, Op IT&T and non Op CAPEX	+289.2	-14.9	+0.0	-14.9
	Total	+1867.9	+19.3	-19.8	+39.0
UKPN	Load CAPEX	+1350.8	+139.8	-113.8	+253.6
	Non load CAPEX	+1319.3	-217.8	-127.1	-90.7
	Other CAPEX	+341.3	-37.0	-24.5	-12.5
	Network Operation costs	+1304.2	+30.1	+21.7	+8.4
	CAI & Smart-metering	+1335.7	+19.3	+0.0	+19.3
	Business support, Op IT&T and non Op CAPEX	+956.8	-54.7	+0.0	-54.7
	Total	**+6608.1**	**-120.5**	**-243.8**	**+123.4**
	% of totex		**-1.8%**	**-3.7%**	**+1.9%**

2 Introduction

2.1 Principles

In other annexes we have described the Outputs that we are committing to deliver during the RIIO-ED1 period (see Annex 2: Forecast Outputs). We have also articulated the various asset management processes which we have used to shape the programme of work that we are proposing (Annex 22: Asset Plan Production Process).

However specifying a programme of work is not just a technical or engineering decision. Ensuring that we deliver those Outputs at the most efficient long-term cost to our customers is a fundamental test of our Business Plan.

This test can be divided into two parts: are we proposing the right mix of activities and the right volume of each? Are we then delivering that optimum volume at an efficient level of cost?

The remainder of this annex focuses on the models, tools and techniques which we have employed to arrive at 'the right cost' for any particular activity. Our approach to achieving 'the right volume' is covered in our suite of justification documents for different asset categories. These are all available in the Asset Management folder on our website.

2.2 Structure of the annex

This annex can be divided into two halves.

The first part describes the process of cost benchmarking and the various models, tools and techniques that have been used in assessing the cost efficiency of our business plan. It also reflects on the choices that we have made in modifying Ofgem's fast-track assessment model and the constraints and challenges that have been encountered.

The second part presents our detailed assessment of the expenditure plans for each of our three networks in turn, and which was summarised in Table 4 and Table 5.

Sections 8, 9 and 10 refer to EPN, LPN and SPN respectively and are designed to present the relevant disaggregated analysis, such that a stakeholder with an interest in one DNO need only refer to one section for a complete view.

The underlying analysis can be found in the following sections of this document, as shown in Table 6.

Table 6 Structure of the annex

Cost area	Section
Combined assessment	6
Totex (macro CSV)	7
Totex (bottom up)	7
Load-related capital expenditure	8.2.1, 9.2.1, 10.2.1
Non load-related capital expenditure	8.2.2, 9.2.2, 10.2.2
Other capital expenditure (network)	8.2.3, 9.2.3, 10.2.3
Network operating costs	8.3, 9.3, 10.3

Cost area	Section
Closely associated indirects (CAIs)	8.4, 9.4, 10.4
Business Support	8.5, 9.5, 10.5

3 The cost benchmarking process

3.1 Models, tools and techniques

In developing its framework for the RIIO-ED1 price control, Ofgem, working with the DNOs, has developed a range of tools that can assist in assessing the efficient cost to deliver either individual activities or the plan in its entirety.

Ofgem uses the term 'assessment toolkit' to describe the set of assessment methods that are at its disposal. This is an approach that UK Power Networks warmly welcomes as it recognizes explicitly that efficiency is not always easy to assess definitively.

Often, 'the answer' will vary, depending on which method/tool you use, and in reality, benchmarking may do little more than alert you to the fact that the costs or volumes associated with a particular activity need closer scrutiny. Hence being able to apply a number of tools can provide a richer and more balanced picture of the relative strengths and weaknesses of a company business plan.

Echoing the work done by Ofgem, UK Power Networks has applied a range of tools to assess the efficiency of its business plan and the individual proposals within it. These are described in the sections below:

3.2 Disaggregated analysis

As part of our annual regulatory reporting, DNOs are familiar with the need to present actual data on the volumes of work undertaken and the associated costs. This reporting embraces all of our activities and has been codified in the form of a set of categories of cost, e.g. asset refurbishment costs, call centre costs etc.

The business plan is constructed using a very similar structure and we have been required to provide both historic cost and volume data and forecasts for the remaining years of the DPCR5 period and the eight years of RIIO-ED1.

Hence, each DNO provides a set of data, constructed to a common set of rules, which Ofgem can then use to assess the efficiency of each of these cost categories in turn. This is referred to in the assessment process as the disaggregated model.

Due to the very different natures of activities such as refurbishment and call centre, there is not a single, consistent method which can be applied to assess all categories. The major techniques that are used in the disaggregated modelling include the following:

- Unit cost analysis – to identify a cost to deliver one unit, for activities which are relatively simple to define and can be readily compared across the DNOs.
- 'Bottom-up' build – to establish the efficient cost of an activity by breaking the cost down into its constituent parts and identifying an appropriate cost for each part. The cost of the activity is then arrived at by summing the costs of these smaller components.
- Statistical benchmarking – to identify an efficient cost for an activity by applying a statistical method, such as regression analysis, where there is a clear correlation between a specific cost category and an external driver.
- Trend analysis – to assess expenditure proposals in light of past expenditure or delivery volumes. Whilst history is not a perfect guide to the future, one might expect there to be continuity of costs or volumes over time.

One can also consider extending some of the cost benchmarking techniques beyond the obvious industry comparators, to assess your performance against leading companies in other similar industries, although the comparability of data can become an issue.

- Over and above these more 'mechanical' techniques, companies can supply their own analysis to demonstrate that the proposed costs or work volumes are efficient. In some cases, this can be more qualitative in nature, rather than relying on a numerical or analytical approach. Examples of these supporting methods are as follows:
- Cost benefit analysis – a formal technique to compare quantified costs and benefits over a defined period and hence assess whether a proposal "pays back".
- Project-specific justification – this is a detailed investment case for proposed expenditure, which may include the elements of a cost-benefit analysis, but goes beyond this to describe the underlying issues, the options that have been considered when arriving at the proposals, the risks or dependencies that may accompany the project etc.

Also, it can be useful to obtain an external perspective or reference point against which to measure your own proposals. There are a number of ways in which this can be obtained:

- Expert review - an independent view, provided by a third party, in respect of any or all aspects of an expenditure proposal. This may be as fundamental as providing a challenge to the requirement for the work, through to something specific such as advising on a unit cost.
- Market Testing/Tendering – confirming the probable cost for a specific proposal by inviting third party providers to tender for them, and thus obtaining a 'real-world' view of the expenditure required.

3.3 Totex - the holistic view

There are a range of tools and techniques which can be applied to assess the cost efficiency of a particular activity. However, a business plan is more than a simple collection of discrete activities which can be considered independently.

In developing the business plan, a DNO will make many choices, driven by its own internal considerations and the external demands of its stakeholders. Each of these decisions may be rational in its own right, but as these decisions combine, one with another, it is easy to imagine a situation in which different companies could produce very different business plans to address the same basic objectives.

For this reason, it is important that there are mechanisms available to Ofgem which enable it to consider DNO proposals on a more holistic basis and hence challenge any company which appears to be making sub-optimal choices when assembling its business plan.

The effects of spending decisions over time are also important. Any company can cut its expenditure for a short period, but the probability is that this will result in greater expenditure at some point in the future. Again, the toolkit needs to include models which make a judgment as to whether the choices that a company is making today are the right ones, and will deliver at the optimum cost level over the longer-term.

The Ofgem assessment process take account of the holistic view through the use of two Total Cost (known as "Totex") models, as follows:

- Total Cost ("macro CSV") model – a regression-based statistical model which assesses the efficient cost of operation based on a number of service characteristics, such as the number of customers served, units distributed across the network etc.
- Total Cost ("bottom-up") model - a regression-based statistical model which assesses the efficient cost of operation based on a number of key activity level drivers, such as the number of faults on the network, the scale of the network etc

3.4 Combining Totex and Disaggregated models

Whilst assessing a business plan from two very different perspectives will provide useful insights into the efficiency of the business plan, and the specific activities within it, there is an inevitable desire to settle on a definitive view of the overall efficiency of the plan. This is a particular issue in a regulatory price control, as this measure of efficiency needs to translate ultimately into cost allowances for the DNO and these cost allowances will be reflected into charges for end-customers.

In the fast-track assessment model, Ofgem has opted to bring together the results of the two totex and disaggregated models by a simple arithmetical weighting of the results, as follows:

- Totex (macro CSV) – 12.5%
- Totex (bottom-up) – 12.5%
- Disaggregated – 75%

Clearly, there is the scope for Ofgem to adjust these relative weightings. Our preference would be to see a greater weighting on the Totex (macro CSV) results, as we believe that the Totex (bottom-up) and Disaggregated views are closely aligned, and hence what is essentially a 87.5% weighting, derived from a bottom-up view, is disproportionate and could result in an unbalanced overall assessment.

4 Use of the assessment models

For a number of years, UK Power Networks has actively benchmarked itself against the other DNOs, as a means to identify our relative efficiency given the outputs we are required to deliver. However, this can never be a perfect process, by virtue of the fact that one is comparing the operations of different companies serving different regions with different customer needs and using networks with different histories.

For that reason, UK Power Networks has always taken the view that any assessment of efficiency needs to look at a company from a number of different standpoints. Hence, as previously described, we are supportive of Ofgem's adoption of a toolkit of assessment methods and models, recognizing that there is no single right answer as to what defines an efficient cost.

In benchmarking our revised business plan, we have taken the assessment model that Ofgem employed in its fast-track cost assessment, the details of which were published in December 2013, as our foundation.

4.1 Proposed amendments to the assessment model

In presenting its fast-track assessment model, Ofgem was careful to state that this was built for the primary purpose of identifying suitable candidates for fast-tracking. The assessment of those companies who were required to re-submit their business plan would potentially be subject to a different assessment process. Consistent with the policy of consulting the DNOs, which helped to shape the fast-track assessment, Ofgem also solicited the opinions of the DNOs regarding the assessment model, in an effort to refine it further.

In addition to identifying small errors in the model, UK Power Networks has presented a series of proposed changes to Ofgem which we believe are required to make the assessment process more effective. These are detailed below:

4.1.1 Regional costs justification

As an industry, each DNO essentially performs the same set of functions, such as building new network, fixing faults etc.; however this does not mean we are identical. We have different mixes of customers; serve different geographies from the heart of our cities to the Highlands of Scotland or the Welsh coasts and mountains, and the economic backdrop and legacy of past network investments varies enormously.

Even within UK Power Networks, we see huge variation across our three networks, spanning the open, sparsely populated fen lands of East Anglia to the very heart of London where a single building, 'the Shard' has the same maximum demand as the not insignificant town of Colchester.

Over the last 20 to 30 years in particular, London and the South East has established itself as the economic powerhouse of the UK. Economic growth has consistently outstripped the rest of the UK, and with this dynamism we have seen major influxes of population, and hence growth in households. Most experts expect this growth to continue and accelerate, with a wider divide opening up between these regions and much of the rest of the UK.

With this vitality in the regional economy, it is well established that London and its environs face a higher cost of living which is usually recognised through 'London weightings' or alternative pay scales. This is clearly an additional cost which is not in the control of UK Power Networks management; however we need to respond to it, particularly as we need to recruit and retain our highly skilled workforce.

In addition, the simple act of operating in a city of the density and vigour of London brings its challenges, many of which manifest themselves in the form of additional costs. These challenges span everything from traffic congestion and accessing network equipment much of which is sited in third-party buildings to the difficulty in excavating roads and pavements which are used by many other utilities.

All of these factors have a very significant cost implication which is simply not faced by those DNOs responsible for less densely occupied areas.

As these costs are beyond our control, any benchmark comparisons with the other DNOs must take full account of them. In our analysis we have made adjustments to our cost base to reflect this, in the following areas:

Table 7 Adjustments to reflect implications of regional cost factors

	LPN - £m per annum	SPN - £million per annum
Replacement	6.7	3.5
Reinforcement	3.1	1.2
Civils	1.1	0.3
Operational IT&T	0.9	0
Faults	6.1	2.5
ONIs	0.3	0
I&M	4.0	0.8
Indirect costs	8.3	2.2
Total costs	30.2	10.5

Note: we have opted not to include any allowance for regional factors in our analysis of EPN, even though EPN covers large swathes of North London and the inner Home Counties such as Hertfordshire and Essex. This is in recognition of the compensating effect of cheaper operations in the more rural areas in the north of the region.

A more detailed discussion of regional costs can be found in: Annex 13a: Regional Cost Justification. This includes a detailed mapping of the various cost factors described to the business plan cost categories – see appendix A.18 of annex 13A.

4.1.2 Assessment of closely associated indirect costs

The most significant area of disagreement we had with the fast-track assessment model related to the benchmarking of closely associated indirect costs.

These costs had been assessed using a regression-based approach which we agree was appropriate however; there are three deficiencies within the model that need to be addressed:

- The model made use of a new measure of scale that was not explained
- The model asserted that the vast majority of these costs were only a function of the scale of the network, and were not influenced by the extent or driver of the direct activity
- The model did not recognize the extent to which DNO groups, with more than one network, could consolidate many of these activities
-
- These issues are explained in more detail below:

Scale variables

A number of the closely associated indirect cost categories, are known as Engineering Indirects. These embody those activities which very closely support the delivery of work on the network, and include Network Design, Project Management, Engineering Management & Clerical Support and System Mapping.

It is reasonable to assume that the scale of a DNO's network will have an influence on the amount of physical activity on the network, such as replacement of assets, and hence by extension, there will also be a relationship with the engineering indirects, for example, a larger replacement programme will require greater project management and design resource.

We have a measure of network scale in the industry, known as MEAV, which is derived by assessing the cost of rebuilding the network from scratch. There are some issues with the choice of MEAV, for example, the fact that a large rural overhead network, which may well generate a large MEAV, might actually be relatively cheap to operate. However, it is a well-understood measure and one that is relatively easy to calculate and difficult for any company to manipulate.

Rather than use MEAV as its scale variable, there was an attempt to modify this variable through a process of weighting. It was not clear to us what additional insight this weighting brought, and it was evident that its use benefited some DNOs and disadvantaged others.

In light of this experience, in our assessment we have opted to reinstate MEAV as our scale variable for the assessment of closely associated indirects.

The impact of growth and activity on CAIs

Whilst we are content with the use of a scale variable, in the form of MEAV, as part of our assessment of CAIs, we would argue that it is self-evident that there must be other drivers of these costs. By way of example, imagine two networks of identical scale, one of which is new and the other is 50 years old. It is reasonable to assume that the old network will generate a much greater requirement for investment, in the form of replacing life-expired assets, and the engineering indirect costs would need to be greater to support this investment. Basing an assessment on a scale variable alone would not identify this additional driver of cost and perversely in the case of the new network would suggest that a level of design, project management etc. was required even where little or no direct activity needed to be undertaken.

Hence in assessing those activities represented by the closely associated indirect costs, consideration needs to be taken for the activity that is occurring on the network, in addition to the scale.

This is not a new debate, and for the DPCR5 price control, Ofgem included the value of network investment as a proxy for the level of activity when assessing CAIs. However this use of a monetary value was controversial as it could create the perverse incentive of making inefficiency in direct expenditure benefit a DNO.

Allied to this issue, is the need to consider all types of activity on the network. The fast-track assessment model was very focussed on internally driven investment, such as asset replacement. In our region however, the effects of external economic growth are every bit as important – in LPN we are forecasting to spend more on reinforcement of the network in RIIO-ED1 than on replacement. Hence both these internal and external factors need to be factored into any assessment of network investment and its complementary indirect costs.

It is our belief that network scale is an adequate measure of the internal drivers of network investment. However we propose to make use of an external variable, namely peak demand, to represent the requirements of the economy in the region that we serve. This is a suitable driver, firstly because it is outside the control of the DNO and secondly, because it is a reflection of what is happening in the real-world.

The combination of MEAV and peak demand creates a more meaningful driver for the assessment of the engineering indirects.

Different organizational structures – Group vs. DNO

Finally, since becoming a single company, owning three networks, we have sought to find opportunities to standardise and consolidate many of our business functions. Whilst there are differences between the needs of our networks, and one-size does not always fit all, many aspects of what we describe as CAIs are now delivered through unified business functions.

We would accept that other companies will arrive at other conclusions as to the optimum structure for the delivery of these services. For example, two of the groups operate networks that are geographically separate and hence there may be a rationale for maintaining separate functions in each of their DNOs.

However, we have proposed that Ofgem should, as a minimum, introduce a degree of DNO group level analysis into its assessment process. There is nothing to be lost in doing so, and it may highlight the advantages or otherwise of these different organisational approaches.

Summary

We would argue that the changes described above are rational and easy to understand – an important test which should always be applied when making statistical judgments. Furthermore, having adapted the assessment model as described, the regression analysis that results has much better statistical properties than those produced using the fast-track assessment model.

Whilst statistical outcomes are not the be all and end all, the combination of a strong rationale and good statistical results is a powerful one, and we would urge Ofgem to adopt these ideas in the assessment of our business plan.

4.1.3 Assessment of business support costs

One of the most complex areas of the fast-track cost assessment model is the method applied to Business Support costs. This makes use of a monte carlo analysis which, in simple terms, attempts to find the optimum cost level for the delivery of the corporate functions.

We have real concerns with the outcome of this analysis, as the results produced for UK Power Networks are demonstrably inconsistent with the treatment of other similar-sized companies. Furthermore they are then a key input to the assessment of expenditure for non-operational capex and hence we are disadvantaged again.

We have suggested that Ofgem should look again at its modelling of this area. Our preference would be for a disaggregated examination of each of the five cost categories that make up Business Support, plus the different classes of non-operational capex.

This would create consistency with the remainder of the disaggregated model and should provide far greater insights into the efficiency of the very different cost categories that make up Business Support and non-operational capex.

We have not sought to create a new model as Ofgem has all of the cost and driver data it requires to undertake a disaggregated regression analysis. The results that we present in our assessment should be considered to be very much a worst-case result and in reality, we would expect the assessment of our costs to improve given a more appropriate assessment model.

As a final point, a number of the DNO groups detected a significant error in the model concerning the treatment of the modelled costs. In our assessment we have ‘fixed’ this error and this results in a marked improvement in the outcome.

4.1.4 Other amendments

In studying the assessment model, we have noted a number of small formula and methodological errors, the likes of which are almost inevitable in a large and complicated, spreadsheet-based model. These have been reported to Ofgem and fixed in our version of the model.

A list of these amendments is included at appendix A.1

5 Benchmarking our plans

The remainder of this annex comprises the outputs of the comparative analysis that has been undertaken in preparing this business plan, in the form of a pack for each DNO.

5.1 Introduction to benchmarking sections

Section 6 concentrates on the 'combined assessment'. This is the mechanism through which Ofgem brings together the results of its two Totex models and the disaggregated model, to produce a single assessment of the efficiency of each DNO and each DNO group.

Section 7 documents the results of the assessments using the Totex models.

Sections 8-10 are grouped by DNO, and contain the assessment using the disaggregated model. Whilst we present results for all of the cost categories, we have limited our discussion to those which the assessment suggests are inefficient.

It should also be noted that much of the commentary and explanation has been repeated in each of sections 8-10. This is intended to enable any stakeholder, who is only interested in one DNO, to find all the information they require within that section.

Note: all figures quoted in the following analysis are in £million.

5.2 Points to consider

Inevitably, in undertaking this analysis, we have had to make certain choices, and in some cases, compromises which any reader needs to be aware of. These are documented below;

Benchmarking of forecasts

In an ideal world, this annex would be concerned with benchmarking our business plan against the other DNOs business plan resubmissions. Of course, we do not have access to their forecasts and hence we have had to find an alternative way of assessing our plan.

To address this issue, we have used the most recently available data for the other DNOs in the form of the business plan data as locked-down and circulated by Ofgem as part of the fast-track cost assessment model.

It is possible that other DNOs may choose to make significant changes to their plans, prior to resubmission, and the greater such changes the less accurate our assessment is likely to prove.

Choice of cost drivers

One of the key subjects of debate in the RIIO-ED1 cost assessment working group, and every previous price control, is the explanatory data or 'cost drivers' that should be used to assess the corresponding cost data. Past experience is that the choice of driver can have a profound impact on the outcome of the assessment, and hence the DNOs are prone to argue for drivers that they believe will benefit them.

We have made relatively few changes to the cost drivers used by Ofgem in its fast-track assessment with the exception of our treatment of closely associated indirects, where we have introduced a growth/activity driver and proposed that a group-level analysis should also be used.

If Ofgem were to make major changes in their choice of cost drivers, then this would be likely to result in a different assessment of our business plan.

Applicability of benchmarking to Capital Expenditure

Some aspects of capital expenditure are sufficiently standardised that they can be considered readily comparable across the DNOs, for example, the replacement of certain assets, such as a pole to support an overhead line.

Other capital works however are much more specific in nature. This might be because of the sheer size or complexity which makes them inherently unique. Alternatively, it may be because there are significant external factors influencing the works, for example, the work may be driven by a customer requirement such as a Connection or the need to move/divert our infrastructure.

In such cases, the only practical way to assess this expenditure is by examining the proposed activity on a case-by-case basis.

As part of such analysis, one might be able to make use of benchmarks, for example, where a very large capital project included the replacement of certain assets, it would be sensible to compare the costs with those which are observed in routine replacement of life-expired assets. However this should have been done as part of the design and justification of the project.

In the detailed benchmarking in sections 7-9, those areas of capital expenditure which are more suited to detailed scrutiny are identified and links are provided to the supporting documents where the justifications can be found. We would expect the consideration of supporting material, such as these justification documents, to be absolutely central to Ofgem's assessment. It is important that the limitation of mechanical modelling is recognised.

Direct Cost Efficiency project

In setting our costs for this business plan, we have undertaken a root and branch review of many of our key operational activities, and more specifically what they should cost to deliver. This has taken the form of a 'bottom-up' build of our costs considering the labour, contractor and material elements, together with any additional costs, such as those associated with streetworks. This information has been instrumental in setting our unit costs for a range of activities. Further information on this can be found at Annex 13b: Direct Cost Efficiency.

Monetisation

The fast-track assessment model includes the facility to make an allowance for two specific circumstances which impact the broader efficiency of the plan:

- Where a DNO offers to deliver additional value to customers by giving up a part of a financial reward which it might be entitled to.
- To reflect different companies using different costs of equity – as this is ultimately funded by the customer, Ofgem considers it reasonable to factor it in to its assessment of the efficiency of the overall plan

For the purposes of our assessment, we have made the following assumptions:

- retained the benefit that WPD received through agreeing to a more demanding set of IIS targets
- set the Ofgem view of cost of equity to be 6.0% and assumed that all other DNOs will also opt for 6.0%, with the exception of WPD who receive 6.4%

5.3 Further features of the assessment model

There are three other points we would like to highlight when interpreting the results of our benchmarking:

Cost and volume efficiency

For the majority of the cost categories, the assessment model simply produces an estimate of the efficient cost of delivering that activity, which can then be compared with the cost included within the business plan.

However in a number of cases, Ofgem has attempted to make a judgment not only of the cost efficiency but also whether the volume of activity being proposed is also appropriate (referred to as 'volume efficiency'). This volume efficiency can then be given a value by, for example, applying the efficient unit cost to the excess volume. This is a reasonable position to take as delivering too much volume, even at an efficient unit cost, still equates to the DNO spending more than it needs to.

We have taken careful note of those areas where this volume analysis is undertaken and have provided written justifications in support of the volumes that are being proposed.

This volume dimension to the analysis also produces some 'strange' results as there are examples where the model is detecting what it interprets as excessive volume, however these large volumes result in very low unit costs. It is therefore possible to find a large positive adjustment in respect of cost efficiency and a large negative adjustment in respect of volumes. The reverse of this can also occur.

These results then cancel each other out in part, leaving an overall result which is either positive or negative but with either the cost or volume efficiency adjustment being larger than the overall efficiency adjustment

Scaling of the benchmarking results

In presenting the disaggregated analysis, there is a requirement to scale the estimate of the efficient costs ("modelled costs"). This is a consequence of the fact that the disaggregated model does not set the overall benchmark cost at the level of the most efficient DNO, but instead uses an 'upper quartile', i.e. in effect setting the overall benchmark at a level of efficiency between the 3rd and 4th ranked companies.

There is a strong rationale for this use of upper quartile, as the adoption of a less stringent benchmark addresses one of the major flaws of the disaggregated approach, namely that it creates a benchmark which is impossible to achieve, as a company could only be deemed efficient, if it was the most efficient in respect of every activity performed.

The scaling factor is calculated using the method present within Ofgem's assessment model and equates to a multiplier of c.1.09.

Rounding of results

In presenting the results from the disaggregated model, in particular, various sub-totals and totals are derived. With the scale of expenditure, and the limiting of figures to one decimal point, there will be occasions where the total does not equal the sum of the items shown.

This is a result of the impact of rounding and no attempt has been made to modify this, for the purposes of this document. This ensures that the results remain consistent with the underlying calculations, which we expect to provide to Ofgem.

6 Combined assessment

6.1 Introduction

As previously described, there are three assessment models: two totex models and the disaggregated model.

The results from these models are then combined using the following weights, which Ofgem used for the fast-track assessment:

- Totex (macro CSV) – 12.5%
- Totex (bottom-up) – 12.5%
- Disaggregated – 75%

As stated in section 3.4, we would wish to see a greater weighting towards the macro CSV model.

6.2 Results

- We have applied the method for combining the three assessments as supplied by Ofgem, as part of its fast-track assessment model. This results in the following comparison of submitted and modelled costs:

Table 8 Combined assessment for the ED1 business plans – DNO level

DNO	Submitted costs (£m)	Modelled Costs (£m)	Efficiency Score	Rank (of 14 DNOs)
EPN	2,793	2,736	102%	5
LPN	1,964	1,840	107%	9
SPN	1,872	1,858	101%	3

Table 9 Combined assessment for the ED1 business plans – DNO Group level

DNO	Submitted costs (£m)	Modelled Costs (£m)	Efficiency Score	Rank (of 6 groups)
UKPN	6,629	6,434	102%	2

Clearly one needs to be careful, particularly in respect of rankings, as the business plans for the other DNOs will doubtless change, however the figures quoted do indicate the progress that UK Power Networks have made in revising the business plan, and support our view that this plan provides excellent value for money for customers.

7 Aggregated benchmarking

7.1 Totex benchmarking

Introduction

The Ofgem assessment model comprises two total expenditure ('totex') models. Both are statistical, regression-based models but which differ in respect of the cost drivers employed:

- Totex ("macro CSV") model – a statistical model to assess the efficient level of cost for operation of a DNO based on a number of service characteristics, such as number of customers, units distributed across the network etc.
- Totex ("bottom-up") model - a statistical model to assess the efficient level of cost for operation of a DNO using the key activity-level cost drivers, such as number of faults, network scale etc.

7.2 Results

We have undertaken the two totex analyses, as specified in Ofgem's fast track assessment model. This produces the following Totex assessment of our ED1 business plans:

Table 10 Efficiency assessment using the Totex (macro CSV) model for the ED1 period

DNO	Submitted Costs (£m)	Modelled Costs (£m)	Efficiency Score
EPN	2,795.4	2,840.5	98%
LPN	1,965.5	2,038.9	96%
SPN	1,873.2	1,878.0	100%
UKPN	6,634.2	6,757.4	98%

Table 11 Efficiency assessment using the Totex (bottom up) model for the ED1 period

DNO	Submitted Costs (£m)	Modelled Costs (£m)	Efficiency Score
EPN	2,795.4	2,760.6	101%
LPN	1,965.5	1,785.2	110%
SPN	1,873.2	1,814.6	103%
UKPN	6,634.2	6,360.4	104%

8 EPN – Disaggregated Benchmarking

8.1 Summary

A summary of the results of the assessment of the EPN business plan is presented in Table 12 below. In the following sections, the categories of expenditure highlighted are broken down to provide a more detailed assessment of the activities of which they are comprised

At a totex level, the disaggregated cost assessment model produces a benchmark cost of £2,752.8 million. Our business plan proposal of £2,779.5 million is within 1% of this value, and therefore we would argue falls well within a reasonable margin for error within the model

Also, it is worth highlighting the trade-off between the assessments of cost and volume efficiency - a feature which is described in further detail in section 5.3.

The assessment model judges that the volume of work that is being proposed in the plan is substantially greater than is necessary, but the cost of that work is exceedingly efficient. In fact, we estimate that the volume gap is valued at £206.2 million, but this is counter-balanced by a cost assessment which is £179.6 million better than benchmark.

In the supporting documentation within this business plan, we have provided extensive written justifications of the capital expenditure in particular that is required, and hence we expect Ofgem to acknowledge that the volume gap that their model identifies can in fact be explained.

On that basis, EPN will benchmark as being significantly better than benchmark and we have no hesitation in stating that this plan is efficient, and will offer excellent value to customers.

Table 12 Overall benchmarking - EPN

EPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Load CAPEX	496.2	90%	-311%	411%
Non load CAPEX	579.1	114%	54%	46%
other CAPEX	161.1	123%	30%	70%
NOCs	606.8	98%	32%	68%
CAI & Smart-metering	556.9	95%	0%	100%
BS & non Op CAPEX	379.1	105%	0%	100%
TOTAL	2779.5	101%	-774%	674%

It should be noted that for load-related capex and the overall assessment, the disaggregated model suggests that there is considerable inefficiency in respect of volume, offset by considerable efficiency in respect of cost – a feature that was described in section 5.3.

For load-related capex, the cost efficiency in absolute terms is greater than the volume inefficiency and hence overall the category benchmarks as efficient.

At an overall level, the reverse is true and hence EPN benchmarks as slightly inefficient.

Following consideration of the many written justifications that are provided within the business plan, we are confident that much of the apparent inefficiency in volume will be eliminated and hence EPN will benchmark overall as efficient.

8.2 Network capital expenditure

Introduction

Network capital expenditure accounts for approximately 45% of the proposed expenditure in the EPN business plan.

This is the physical investment we will make in the network itself and the supporting infrastructure, which is required for its operation, such as the operational buildings to house it.

For clarity, it is broken down into three sections:

- Load-related: investment driven by demand or external requirements
- Non-load related: investment driven by the condition of assets or legal, safety or regulatory requirements
- Other: investment required as a result of specific initiatives or in other elements other than network assets

LOAD-RELATED CAPITAL EXPENDITURE

'Load related' expenditures are driven by an increasing requirement for electricity, either as a result of a rise in the general demand or a large development that increases the demand at a specific point, e.g. a new housing estate or commercial building. Also included within this category are Diversions, which are external requirements for changes to the network, e.g. the need to move equipment as a result of a development such as a road scheme.

There is a significant challenge with benchmarking much of load-related capital expenditure because the volumes, mix and complexity of work will be specific to the circumstances or external drivers faced by each individual DNO. By definition, this has the scope to significantly impact on the proposed costs.

Table 13 provides a summary of the outcomes from the benchmarking of load related capital expenditure. This shows that EPN is significantly better than benchmark in respect of the proposed load-related capital expenditure, with a benchmark cost of £548.9 million, compared with the proposal of £496.2 million.

Again, Ofgem's model suggests that substantial volume reductions are required, but these are more than offset by the cost efficiency of the business plan.

The detail that underpins this can be found in the supporting sections.

Table 13 Benchmarking of load related Capital Expenditure - EPN

EPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Connections	48.7	108%	0%	100%
Diversions	115.1	100%	0%	100%
Reinforcement	295.2	91%	-565%	665%
TCP	15.2	94%	0%	100%
HVP	22.2	46%	0%	100%
Total	**496.2**	**90%**	**-311%**	**411%**

Discussion of these results is limited to those categories which benchmark as inefficient, plus reinforcement.

Connections

Description:	A 'connection' is the provision or upgrading of individual metered exit points, points of connection for independent networks and ICPs and unmetered connection work. The provision of each of these 'connections' must be delivered via a Connections project, which refers to each project covered by a connection quotation offered to a customer. The expenditure captured under this heading relates to the following: • Connections where the first expenditure occurred during the DPCR4 period, i.e. prior to 1st April 2010 • The cost of any connections where reinforcement is required to facilitate delivery of the connections project. This is further split between costs funded by the connecting customer and costs funded out of Use of System charges (i.e. by the whole customer base)

Connections-related costs are driven by demand from customers wishing to connect to the network. Each DNO will bring forward its own forecasts based on its local market for Connections, and by definition these are attempts to estimate the number and scale of external requests. The only certainty is that these will to some degree, either under or over-estimate the level of demand.

Furthermore the scale of the expenditure will reflect the particular circumstances that arise as a result of the request for the connections.

For this reason, we would argue strongly that a model-based approach to benchmarking is inherently problematic and Ofgem should place greater emphasis on the quality of evidence provided by the DNOs.

The justification of our forecasts in respect of cost and volume can be found in the suite of Asset Management documents on our website.

On that basis, we are content to suggest that our plan can be considered efficient.

Diversions, Wayleaves and Easements

Description:	Diversions captures the expenditure associated with situations where network assets need to be moved as a result of an external event, or alternatively payments need to be made to secure the retention of assets in an existing location.

Like connections, diversions are driven by localized, external events and as such they are not suitable for benchmarking between DNOs.

The justification of our proposed Diversions-related expenditure in EPN can be found in EPN's load related asset plan.

We note that our business plan forecast is within 1% of the model's benchmark. When combined with our written justifications, we are content to argue that this expenditure is efficient.

Reinforcement

Description:	Reinforcement is enhancement to the network to address an existing constraint or to facilitate growth in load or generation. To aid understanding, expenditure on reinforcement is further broken down to reflect the different reasons underlying the need to reinforce.

The requirements for reinforcement will be specific to each DNO, as they are driven by growth in the load on the network. In many cases, the only way to assess this area of expenditure is through consideration of the actual schemes proposed so as to judge whether the case has been made for undertaking them, and that the solution proposed is the most efficient available.

We note that the Ofgem assessment model benchmarks our proposed reinforcement expenditure as being efficient but, yet again, suggests too much volume is being proposed, albeit counter-balanced by a highly efficient unit cost for the work.

As we indicate above, we are sceptical of the suitability of using a mechanistic model to assess an area of expenditure such as reinforcement. We have prepared a written 'scheme paper' for each reinforcement project which defines the requirement, the various options that have been considered and the solution we have arrived at. These are further supported by cost benefit analysis as appropriate.

On that basis, we believe that we can answer the question raised by the model, in respect of proposed volumes. Once the volume adjustment suggested by the model is eliminated, reinforcement can be considered efficient in all respects.

The justification for these categories can be found in EPN's load related asset plan.

NON- LOAD RELATED CAPITAL EXPENDITURE

'Non-load related' expenditures are driven by the condition of the network.

This falls into two main categories:

- expenditure to either replace an asset which has reached the end of its life or, alternatively, extend the life of assets through the replacement of significant components or sub-systems (refurbishment).
- expenditure which is driven by a legal, safety or regulatory requirement, for example, ensuring that overhead lines provide sufficient clearance.

Of the non-load categories, asset replacement dominates, accounting for almost 80% of the total expenditure. Unlike much of the capital expenditure, this is one area that is more suited to the kind of benchmarking represented by Ofgem's assessment model.

This is because, at the lower voltages in particular, tasks are relatively standardised and hence a unit-cost approach is a reasonable method for assessing cost efficiency. However volume efficiency requires a more considered approach, taking into account the health of the assets.

Table 14 provides a summary of the results from the benchmarking of non-load related capital expenditure. This shows that EPN is significantly worse than benchmark in respect of the proposed load-related capital expenditure, with a benchmark cost of £507.9 million, compared with the proposal of £579.1 million.

Ofgem's model suggests that slightly more than half of the difference is due to unnecessary volume being proposed with the remainder a result of inefficient unit costs. This assessment is further discussed in the following sections.

Table 14 Benchmarking of non- load related Capital Expenditure - EPN

EPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
ESQCR	46.7	93%	100%	0%
Asset replacement	450.6	118%	59%	41%
Refurbishment	31.9	110%	62%	38%
Legal & safety	49.9	108%	0%	100%
Total	**579.1**	**114%**	**54%**	**46%**

Detailed discussion is provided for those categories which appear inefficient.

Asset replacement

Description:	Asset replacement refers to the expenditure undertaken in replacing existing assets or dismantling assets in the process of replacement. The requirement to replace an asset is typically driven by the condition of the asset, or a concern over safety or environmental impact.

This is the category within the benchmarking of EPN's business plan which shows the greatest difference between the forecast for EPN and the results of the assessment model. The benchmark cost is £382.8 million as against the forecast submitted of £450.6 million, a difference of £67.8 million

Approximately 59% of this difference is a consequence of the assessment of volumes proposed. Our proposed volumes are the product of a sophisticated condition-based forecasting process and hence we are confident that they are appropriate.

The remaining 41% relates to cost efficiency. In its model, Ofgem has judged cost efficiency by reference to a set of unit costs provided by its advisors. We have not had access to the detail of this advice and hence are not in a position to judge how realistic they are.

Ofgem should refer to the detailed justification of both costs and volumes which is provided at the relevant annexes, supplemented where appropriate, by CBAs and scheme papers

We also note that the bulk of our cost efficiency challenge stems from the assessment of replacement costs at the higher voltages. Projects at the higher voltages tend to be the most complex, and costs can be heavily impacted by their context, for example, there may be requirements for supporting works to ensure supply is maintained whilst old equipment is being replaced. Hence in our view these classes of assets are least suited to a simple unit cost assessment.

In summary, we would argue that the use of a mechanistic approach, such as that which is embodied in this model should only ever form a small part of the assessment process. Ofgem should place much greater reliance on the written justifications provided in the business plan, together with the outcomes of discussion with the DNO.

Refurbishment

Description:	A one-off activity undertaken on an asset that is deemed to be close to end of life, or is otherwise not fit for purpose, that extends the life of that asset or restores its functionality. Refurbishment can include the replacement or reconditioning of components of an asset, but is distinct from ongoing maintenance of assets.

The benchmarking of refurbishment suggests that the forecast in the EPN business plan is £3.0 million higher than the benchmark cost of £28.9 million.

The capture of refurbishment costs was a new requirement for DPCR5 and hence there is relatively little historic data upon which to base an assessment. What is more, past experience indicates that it can take a number of years before true consistency of reporting is established amongst the DNOs. This is made all the more likely, as the scope of refurbishment tasks is extremely diverse, from something as superficial as external repairs to an item to a full-scale renovation of an asset performed away from site.

For these reasons, we believe that it is important that Ofgem takes a more rounded view of the assessment of refurbishment and does not rely on the outcomes of the model.

Legal and Safety

Description:	The Legal and Safety category encompasses the costs of any investment or intervention where the primary motivation is to protect the staff and the public, and to ensure adherence with safety standards. It is broken down into a number of sub-categories, as follows: • Site security • Asbestos management • Safety climbing fixtures • Fire protection • Earthing upgrades • Metal theft remedial work • Other costs areas specified by the DNO

We note that our proposed cost is £3.7 million higher than the benchmark cost of £46.2 million.

On inspection of the model, it would appear that this is due to a poor result in the benchmarking of site security for EHV and 132kV substations. We would argue that the cost of such measures will be highly site-specific, and particularly on these larger installations.

Hence we would refer Ofgem to our written justifications on Legal and Safety and anticipate that this will demonstrate the efficiency of our proposals.

'OTHER' CAPITAL EXPENDITURE

The remaining capital expenditure, accounting for around 13% of the total network capital expenditure, is made up of a number of diverse activities, some of which are driven by a specific initiative, such as black-start, or are simply associated with the operation of the network, for example, flood protection.

The summary of benchmarking results from Ofgem's assessment model can be found in Table 15 below.

Table 15 Benchmarking of 'other' Capital Expenditure - EPN

EPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Civil works	87.7	123%	41%	59%
QoS	0.0	n/a	0%	0%
Flooding	7.8	105%	500%	-400%
BT21CN	25.8	461%	0%	100%
Technical losses & other environ	10.3	95%	0%	100%
HILP	0.0	n/a	0%	0%
CNI	14.6	92%	0%	100%
Black Start	4.6	71%	-11%	111%
Rising Mains & Laterals	10.2	76%	0%	100%
Total	**161.1**	**123%**	**30%**	**70%**

'Other' capital expenditure benchmarks as inefficient overall, with a modelled cost of £131.m, as compared with the submitted forecast of £161.1 million. However this is completely explained by the apparent inefficiency of civil works and BT21CN.

Discussion is limited to these categories, together with the category of flood mitigation.

Civils:

Description:	Civil engineering work associated with DNO network assets, including buildings and site works at substations.

Civil works is the single largest category within 'other' capital expenditure, accounting for c.54% of the total forecast. The assessment model suggests that the benchmark cost should be £71.5 million, as opposed to the EPN forecast of £87.7 million.

On inspection of the model, it would appear that EPN's inefficiency in costs is driven by the costs of civil work associated with asset replacement in our higher voltage installations. We would argue that these larger facilities are likely to result in costs which are site-specific and thus highly variable, bound in with the complexity of replacement of such assets. By definition, these are not suitable to a simple unit-cost type comparison

Furthermore, we believe that our volumes are fully justified in the supporting documentation and scheme papers. EPN_Civils, LPN_Civils, SPN_Civils

On that basis we are confident that our civil costs are efficient.

Flood Mitigation:

Description:	Expenditure related to physical or non-physical schemes designed to reduce the risk of a site being flooded.

Ofgem's assessment model suggests that our proposed expenditure on flood mitigation is marginally inefficient. In our opinion, this is not an area that particularly lends itself to mechanistic cost assessment, as it relates to investments in the fabric of specific operational sites.

By definition, each of these sites is different and hence the expenditure requirements will be dictated by the scale of the site, the landscape surrounding it, proximity to water courses etc.

Detailed justification for proposed UK Power Networks expenditure is provided in Non Load Asset Plan EPN: Civils

BT 21st Century (BT21CN):

Description:	Expenditure designed to mitigate against changes in the BT network which might impact on a DNOs ability to communicate, in real-time, with its equipment based in substations.

The Ofgem assessment model judges our expenditure proposals to be inefficient. We would argue that the assessment model is flawed in this area, as it seeks to limit companies to an annual spend which is no greater than that spent during the DPCR5 period.

Following the principle that we should not spend our customers' money until it is necessary, we have managed to avoid the need for much expenditure during the DPCR5 period, however this is purely expenditure deferred and not avoided.

This expenditure will be required during the RIIO-ED1 period, and to refuse it on the basis that we didn't spend on BT21CN during DPCR5 is not a reasonable position.

Detailed justification for proposed UK Power Networks expenditure is provided in Non Load Asset Plan EPN: BT21

We believe that this demonstrates that our expenditure proposals are prudent and efficient.

8.3 Network operating costs (NOCs)

Network Operating Costs (NOCs) is a class of operating expenditure which relates to the day-to-day activities that impact directly on the network. These are accounted for under six headings:

- Troublecall – responding to faults and restoring the electricity supply
- ONIs – additional costs that result from responding to faults. This includes those costs which do not result in a loss of supply to households or businesses, such as street lighting faults or cut-out changes, or other miscellaneous fault-related costs, such as making abortive calls.
- Severe Weather 1 in 20 – the cost of restoring the network when it has been subject to an extreme weather event
- Inspection and Maintenance – inspecting our network assets and undertaking any maintenance that is required
- Tree-cutting – cutting trees and other vegetation so as to minimize the risk of interference with our network assets
- NOCs other – network-related operating costs, including the cost of electricity used in our substations for lighting/heating etc., the operating cost of generation assets based in remote locations, e.g. islands, and the cost of dismantling assets which are no longer required.

The summary of benchmarking of EPN Network Operating Costs can be found in Table 16 below.

Table 16 Benchmarking of Network Operating Costs - EPN

EPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Trouble call	237.9	89%	50%	50%
ONIs	69.7	108%	40%	60%
SW 1-20	7.3	93%	0%	100%
I&M	121.5	96%	0%	100%
Tree cutting	132.6	113%	50%	50%
NOCs other	37.9	99%	0%	100%
Total	**606.8**	**98%**	**31.7%**	**68%**

At an overall level, Network Operating Costs benchmark as efficient however ONIs and Tree cutting appear inefficient at a detailed category level. Discussion of these two categories is provided below.

Occurrences not incentivized (ONIs)

Description:	ONIs (previously referred to as Non Quality of Supply faults) are a class of faults which are not incentivized under the Interruptions Incentive Scheme. In many cases, they will not result in a loss of supply to an end-customer. This category also includes some areas of non-engineering cost which are attributed to the faults process, for example, the cost of abortive visits.

This category comprises of a diverse range of activities, and potentially there are problems in attempting to assess these collectively.

Historically, including at DPCR5, there have been questions about the consistency of reporting in this area leading to concerns about the reliability of any benchmarking. The range of efficiency scores reported, particularly in respect of cut-outs, for example, does suggest that some of these issues persist and hence we are wary of placing any great significance in the outcomes.

The EPN benchmark is around £5 million less than our forecast of almost £70 million – due to the uncertainties associated with the reporting, we believe that this falls within the bounds of efficiency.

Tree-cutting

Description:	Trees and other vegetation have the potential to grow through and interfere with overhead lines, which may result in a fault or even the line being brought down. As a result all DNOs have a responsibility to inspect and cut trees that are close to their overhead line network. There are in fact two standards that DNOs are required to comply with: ENATS 43-8 – a technical specification on overhead line clearances ETR-132 – a report which provides guidance on the management of vegetation with the specific objective of ensuring that network performance is not impaired in abnormal weather conditions. DNOs are funded both in respect of the inspection of the trees on their network, and the cutting whether this is undertaken on a pro-active or re-active basis.

We note that the assessment model suggests that our submitted forecast is £14.8 million more than the benchmark. This service has been outsourced for many years and has been subject to re-tender during the DPCR5 period.

On that basis we would argue that the contract cost, as embodied in our forecast, is the result of market testing and reflects the real costs of tree-cutting within EPN.

8.4 Closely associated indirects and Smart meter roll-out

This section addresses two different classes of expenditure, both of which are closely aligned with activity on the network, as follows:

- Closely Associated Indirects – the activities that support our work on the network. Some are these are very closely related to the operation or development of the physical network, such as network design or project management. Others are more supportive in nature, e.g. call centre, operational training.
- Smart meter roll-out – this is the programme of work associated with supporting the retail supply companies in their roll-out of smart meters

Table 17 Benchmarking of CAIs and smart metering - EPN

EPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
CAI	533.4	95%	0%	100%
Smart meters	23.6	108%	0%	100%
Total	**556.9**	**95%**	**0%**	**100%**

8.4.1 Closely Associated Indirects

Closely associated indirects (CAIs) are the activities, often office-based, which support the direct operations on the network, be that day-to-day activity such as fault response or capital investment in the network.

Unlike the direct cost activities, the use of 'unit costs' is less appropriate, as it is much more difficult to identify a 'unit' of an activity, such as stores or control centre.

Statistical methods, such as regression analysis, have been used as this gives a better understanding of the confidence that can be attached to any metrics, as well as taking greater account of the impacts of economies of scale. Hence we have used this as the basis of our assessment in the following section. Table 18 provides breakdown of CAI benchmarking results.

Table 18 Benchmarking of CAIs - EPN

EPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Network Design	51.1	91%	0%	100%
Project Mgt	58.6	91%	0%	100%
EM&CS	217.8	96%	0%	100%
System Mapping	10.6	90%	0%	100%
Control Centre	47.1	88%	0%	100%
Call Centre	23.8	132%	0%	100%
Stores	17.9	96%	0%	100%
Operational Training	48.6	94%	0%	100%
Vehicles & Transport	54.1	96%	0%	100%
Network Policy	3.8	96%	0%	100%
Total	**533.4**	**95%**	**0%**	**100%**

As can be observed, EPN performs better than benchmark across all categories with the exception of Call Centre. At an overall level, EPN's forecast for the RIIO-ED1 period is £28.4 million better than benchmark.

For this reason, we have limited our detailed comments to the Call Centre category.

Call Centre

Description:	The Call Centre activity relates to the management and handling of all telephone communications with customers in respect of power outages or general enquiries. It also includes the cost of administering and paying any compensation payments due to customers.

UK Power Networks has acknowledged that its performance under the existing Customer Services incentive schemes requires improvement. As part of this response, additional investment is being made in our Customer Services operations and we anticipate that this will continue during the RIIO-ED1 period.

This expenditure is the primary reason for the poor efficiency score in this area, however we believe that it is justified in delivering our customer expectations, and is also supported through the outcomes of the Willingness to Pay research (see Process Overview).

8.4.2 Smart meter roll-out (additional interventions)

In the period from 2015-2020, the DNOs will be required to support the roll-out of smart meters. Whilst not responsible for that roll-out, there will be occasions where the meter installer requires DNOs to attend site, to repair or replace existing DNO equipment in the customer's premises.

Whilst we have undertaken modelling of the likely workload that will result, it is difficult to predict the volume of such incidents; hence Ofgem has assumed an intervention rate of 2.5% in setting cost allowances, with an associated mechanism to adjust the allowance if the intervention rate proves to be either lower or higher.

Ofgem will base the allowance and operation of the uncertainty mechanism on a unit cost. This shows EPN's forecast to be £1.8 million than the benchmark, however that benchmark is by definition uncertain as there are no actual costs upon which to base this.

UK Power Networks has arrived at its proposed unit costs based on a combination of analysis of existing activities where these are similar and a bottom-up build. Detailed justification of our proposed cost relating to the smart meter roll-out can be found at: Annex 10: Smart Metering

8.5 Business Support and Non-operational capex

This section comprises of two distinct but related elements.

Firstly there are the costs of the corporate functions which one might find in any commercial organisation, known as Business Support costs. In Ofgem's analysis, this includes the following activities:

- HR and Non-Operational Training
- Finance & Regulation
- CEO etc.
- IT & Telecoms
- Property Management

Secondly, there are two categories of cost, which arguably could be presented in a number of places in this annex, namely:

- Operational IT& Telecoms – the capital and operational expenditure associated with the IT/telecoms systems which support the operation of the network, for example, the automation systems, control system etc.
- Non-operational capex – capital expenditure on non-network assets, such as IT, property, vehicles

Due to the close relationship with IT and Property we have opted to present these alongside the Business Support costs.

Table 19 summarises the outcome of benchmarking of these costs.

Table 19 Benchmarking of Business Support, Operational IT&T and non-operational capex - EPN

EPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Business support	231.0	95%	0%	100%
Op IT&T	48.3	159%	0%	100%
Non op capex	99.9	116%	0%	100%
Total	**379.1**	**105%**	**0%**	**100%**

As indicated in section 4.1.3, we have major concerns with the method which Ofgem has adopted for the benchmarking of Business Support, but in spite of this, EPN's forecast is still some £12.0 million better than benchmark. For this reason, we have not presented any detailed discussion of these results, and instead focus our comments on Operational IT & Telecoms and Non-operational capex.

8.5.1 Operational IT & Telecoms

Description:	IT equipment which is used exclusively in the real time management of network assets, but which does not form part of those network assets and would include: • Substation RTU's; • Marshalling kiosks; • Receivers; • Communications for switching & monitoring • Hardware & software used for real time management of network assets

We note that EPN appears particularly inefficient, when compared with the benchmark cost for this category.

We believe that this is due to a limitation in the benchmarking which sets the overall benchmark expenditure for the ED1 period as equal to 8 times the average annual expenditure in the DPCR5 period. This has the effect of benchmarking out any increase in expenditure.

UK Power Networks was an early adopter of RTUs in its substations; however that technology is now reaching the point where it needs to be renewed. The assessment method does not take account of such a requirement.

A full justification of this expenditure is provided at: IT Strategy.

Once this is taken into account we believe that our expenditure will be deemed to be efficient.

8.5.2 Non-operational capital expenditure

Description:	Expenditure on new and replacement assets which are not system assets, as follows: • Vehicles - purchase of the commercial vehicle fleet and mobile plant/generation utilised by the DNO or any other related party for the purposes of providing services to the DNO • Plant & machinery • Small tools & equipment • Office equipment • Non-operational properties • Non-operational IT

This includes capital expenditure on a diverse range of items, ranging from hand tools to refurbishment of office buildings or investments in new IT systems.

At an overall level, Ofgem's assessment results in a benchmark expenditure £13.9 million less than the EPN forecast.

As described in section 4.1.3, UK Power Networks have considerable concerns about the method which has been applied to benchmark such costs. As such we stand by the costs that are presented in our business plan and are confident that these are fair and reasonable.

We would also propose that, as at DPCR5, Ofgem commissions external specialists to examine proposed expenditure on property and IT.

9 LPN – Disaggregated Benchmarking

9.1 Summary

A summary of the results of the assessment of the LPN business plan is presented in Table 20 below. In the following sections, the categories of expenditure highlighted are broken down to provide a more detailed assessment of the activities of which they are comprised

At a totex level, the disaggregated cost assessment model produces a benchmark cost of £1,846.6 million. Our business plan proposal of £1,960.8 million is thus less than 6% higher than this value.

Approximately 88% of this difference relates to the assessment of cost efficiency, as against a 12% challenge on the efficiency of our proposed volumes.

In the supporting documentation within this business plan, we have provided extensive written justifications of the capital expenditure, in particular, that is required, and hence we expect Ofgem to acknowledge that the volume gap that their model identifies can in fact be explained.

Whilst the assessment process makes an allowance for the additional costs of operations in London, we would argue that the results of this benchmarking suggest that there are costs over and above this which we have yet to quantify. This reflects the fact that LPN benchmarks substantially worse than our two other networks, even where the activity is undertaken according to the same policies, processes and procedures.

This would suggest that there is something within the external environment or the design of the network which is imposing additional costs.

Table 20 Overall benchmarking - LPN

LPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Load CAPEX	531.9	92%	100%	0%
Non load CAPEX	359.8	145%	52%	48%
other CAPEX	80.8	117%	119%	-19%
NOCs	330.4	101%	-166%	266%
CAI & Smart-metering	369.4	104%	0%	100%
BS & non Op CAPEX	288.5	108%	0%	100%
TOTAL	1960.8	106%	16%	84%

It should be noted that for 'other' capex, the disaggregated model suggests that there is considerable inefficiency in respect of volume, offset in part by considerable efficiency in respect of cost – a feature that was described in section 5.3.

For network operating costs, the reverse is true, with volume efficiency counter-balancing in part apparent cost inefficiency.

Following consideration of the many written justifications that are provided within the business plan, we are confident that much of the apparent inefficiency in both volume and cost will be eliminated and hence LPN will benchmark overall as efficient.

9.2 Network capital expenditure

Introduction

Network capital expenditure accounts for approximately 50% of the proposed expenditure in the LPN business plan.

This is the physical investment we will make in the network itself and the supporting infrastructure, which is required for its operation such as the buildings to house it.

For clarity, it is broken down into three sections:

- Load-related: investment driven by demand or external requirements
- Non-load related: investment driven by the condition of assets or legal, safety or regulatory requirements
- Other: investment required as a result of specific initiatives or in other elements other than network assets

LOAD-RELATED CAPITAL EXPENDITURE

'Load related' expenditures are driven by an increasing requirement for electricity, either as a result of a rise in the general demand or a large development that increases the demand at a specific point, e.g. a new housing estate or commercial building. Also included within this category are Diversions, which are external requirements for changes to the network, e.g. the need to move equipment as a result of a road scheme.

The level of economic growth in London is such that load-related expenditure is at the heart of the LPN business plan. In fact, LPN has the greatest proportion of its capital expenditure devoted to reinforcement of any DNO.

Benchmarking of load-related capital expenditure is particularly challenging because the volumes, mix and complexity of work will be specific to the circumstances or external drivers faced by each individual DNO. By definition, this has the scope to significantly impact on the proposed costs.

Table 21 provides a summary of the outcomes from the benchmarking of load related capital expenditure. This shows that LPN is significantly better than benchmark in respect of the proposed load-related capital expenditure, with a benchmark cost of £581.2 million, compared with the proposal of £531.9 million.

As the only category which benchmarks as inefficient is reinforcement expenditure, we have restricted our detailed comments to this category

Table 21 Benchmarking of load-related Capital Expenditure - LPN

LPN	Total submitted cost (£m)	Efficiency score	volume reduction as % of total reduction	cost reduction as % of total reduction
Connections	13.1	75%	0%	100%
Diversions	32.3	100%	0%	100%
Reinforcement	350.7	122%	84%	16%
TCP	43.4	95%	0%	100%
HVP	92.4	47%	97%	3%
Total	**531.9**	**92%**	**100%**	**0%**

Reinforcement

Description:	Reinforcement is enhancement to the network to address an existing constraint or to facilitate growth in load or generation. To aid understanding, expenditure on reinforcement is further broken down to reflect the different reasons underlying the need to reinforce.

The requirements for reinforcement will be specific to each DNO, as they are driven by growth in the load on the network. In many cases, the only way to assess this area of expenditure is through consideration of the actual schemes proposed so as to judge whether the case has been made for undertaking them, and that the solution proposed is the most efficient available.

We note that the Ofgem assessment model benchmarks our proposed reinforcement expenditure as being inefficient but would argue that the costs of enhancing the network in London are likely to be significantly greater than less densely populated areas in other parts of the country.

As we indicate above, we are sceptical of the suitability of using a mechanistic model to assess an area of expenditure such as reinforcement. We have prepared a written 'scheme paper' for each reinforcement project which defines the requirement, the various options that have been considered and the solution we have arrived at. These are further supported by cost benefit analysis as appropriate.

On that basis, we believe that we can answer the question raised by the model, in respect of proposed volumes, and hence that this area of expenditure can be considered efficient.

The justification for these categories can be found in LPN's load related asset plan.

NON- LOAD RELATED CAPITAL EXPENDITURE

'Non-load related' expenditures are driven by the condition of the network.

This falls into two main categories:

- expenditure to either replace an asset which has reached the end of its life or, alternatively, extend the life of assets through the replacement of significant components or sub-systems (refurbishment).
- expenditure which is driven by a legal, safety or regulatory requirement, for example, ensuring that overhead lines provide sufficient clearance.

Of the non-load categories, asset replacement dominates, accounting for almost 80% of the total expenditure. Unlike much of the capital expenditure, this is one area that is more suited to the kind of benchmarking represented by Ofgem's assessment model.

This is because, at the lower voltages in particular, tasks are relatively standardised and hence a unit-cost approach is a reasonable method for assessing cost efficiency. However volume efficiency requires a more considered approach, taking into account the health of the assets.

Table 22 provides a summary of the results from the benchmarking of non-load related capital expenditure. This shows that LPN is significantly worse than benchmark in respect of the proposed load-related capital expenditure, with a benchmark cost of £248.5 million, compared with the proposal of £359.8 million.

Ofgem's model suggests that slightly more than half of the difference is due to unnecessary volume being proposed with the remainder a result of inefficient unit costs. This assessment is further discussed in the following sections.

Note: there is no ESQCR expenditure on the LPN network as this generally applies to overhead assets. As Legal and Safety expenditure benchmarks as efficient, detailed comments are limited to asset replacement and refurbishment.

Table 22 Benchmarking of non- load related Capital Expenditure - LPN

LPN	Total submitted cost (£m)	Efficiency score	volume reduction as % of total reduction	cost reduction as % of total reduction
ESQCR	0.0	n/a	n/a	n/a
Asset replacement	302.5	159%	52%	48%
Refurbishment	15.4	104%	1%	99%
Legal & safety	41.9	95%	0%	100%
Total	**359.8**	**145%**	**52%**	**48%**

Asset replacement

Description:	Asset replacement refers to the expenditure undertaken in replacing existing assets or dismantling assets in the process of replacement. The requirement to replace an asset is typically driven by the condition of the asset, or a concern over safety or environmental impact.

This is the area within the benchmarking of LPN's business plan which shows the greatest difference between the forecast for LPN and the results of the assessment model. The benchmark cost is £189.7 million as against a forecast of £302.5 million.

Approximately 52% of this difference is a consequence of the assessment of volumes proposed. Our proposed volumes are the product of a sophisticated condition-based forecasting process and hence we are confident that these are appropriate.

The remaining 48% relates to cost efficiency. In its model, Ofgem has judged cost efficiency by reference to a set of unit costs provided by its advisors. We have not had access to the detail of this advice, but we would have particular concerns about a generic set of unit costs being applied to the unique backdrop provided by operations in London. Further description of these issues can be found in Annex 13A: Regional Cost Justification.

Ofgem should refer to the detailed justification of both costs and volumes which is provided at the relevant annexes, supplemented where appropriate, by CBAs and scheme papers

We also note that the bulk of our cost efficiency challenge is stems from the assessment of replacement costs at the higher voltages. Projects at the higher voltages tend to be the most complex, and costs can be heavily impacted by their context, for example, there may be requirements for supporting works to ensure supply is maintained whilst old equipment is being replaced. Hence in our view these classes of assets are least suited to a simple unit cost assessment.

In summary, we would argue that the use of a mechanistic approach, such as that which is embodied in this model should only ever form a small part of the assessment process. Ofgem should place much greater reliance on the written justifications provided in the business plan, together with the outcomes of discussion with the DNO.

Refurbishment

Description:	A one-off activity undertaken on an asset that is deemed to be close to end of life, or is otherwise not fit for purpose, that extends the life of that asset or restores its functionality. Refurbishment can include the replacement or reconditioning of components of an asset, but is distinct from ongoing maintenance of assets.

The benchmarking of refurbishment suggests that the forecast in the LPN business plan is £0.5 million higher than the benchmark cost.

The capture of refurbishment costs was a new requirement for DPCR5 and hence there is relatively little historic data upon which to base an assessment. What is more, past experience indicates that it can take a number of years before true consistency of reporting is established amongst the DNOs. This is made all the more likely, as the scope of refurbishment tasks is extremely diverse, from something as superficial as external repairs to an item to a full-scale renovation of an asset performed away from site.

For these reasons, we are content that the efficiency score of 104% falls within a reasonable margin of error and can be considered as efficient.

'OTHER' CAPITAL EXPENDITURE

The remaining capital expenditure, accounting for around 8% of the total, is made up of a number of diverse activities, some of which are driven by a specific initiative, such as black-start, or are simply associated with the operation of the network, for example, flood protection.

No expenditure is proposed in LPN for the categories Quality of Supply, BT21CN, HILP, CNI and Rising Mains and Laterals. In addition, expenditure on Technical Losses and Black Start benchmarks as efficient. Hence, detailed comments are limited to Civil Works and Flood Mitigation. These two categories are sufficient to make the overall benchmark as inefficient.

The summary of benchmarking results from Ofgem's assessment model can be found in Table 23 below.

Table 23 Benchmarking of 'other' Capital Expenditure - LPN

LPN	Total submitted cost (£m)	Efficiency score	volume reduction as % of total reduction	cost reduction as % of total reduction
Civil works	70.7	115%	149%	-49%
QoS	0.0	n/a	n/a	n/a
Flooding	3.9	388%	0%	100%
BT21CN	0.0	n/a	n/a	n/a
Technical losses & other environ	4.1	94%	0%	100%
HILP	0.0	n/a	n/a	n/a
CNI	0.0	n/a	n/a	n/a
Black Start	2.1	89%	0%	100%
Rising Mains & Laterals	0.0	n/a	n/a	n/a
Total	**80.8**	**117%**	**119%**	**-19%**

Civil Works

Description:	Civil engineering work associated with DNO network assets, including buildings and site works at substations.

Civil works accounts for almost all of the 'other' capital expenditure. The benchmarking model suggests that the benchmark cost should be £61.3 million, as opposed to the LPN forecast of £70.7 million.

However it is notable that this difference of £9.5 million is more than covered by the inefficiency in volume suggested by the model, whereas LPN is seen to be efficient from the perspective of cost efficiency.

We are highly sceptical of the assessment process making judgments about what constitutes an efficient volume of work, and particularly in an area such as civil works. There is a world of difference between a DNO operating in an overwhelmingly rural region and their requirements for civil structures and another DNO operating in a dense urban environment, so we do not believe that reasonable conclusions can be arrived at in respect of volumes of work.

For this reason, we would propose that Ofgem makes use of its assessment of cost efficiency but does not attempt to assess volume, which will clearly be specific to each DNO. On this basis, we would argue that the LPN forecast is efficient.

Flood Mitigation:

Description:	Expenditure related to physical or non-physical schemes designed to reduce the risk of a site being flooded.

Ofgem's assessment model suggests that our proposed expenditure on flood mitigation is massively inefficient. In our opinion, this is not an area that lends itself to mechanistic cost assessment, as it relates to investments in the fabric of specific operational sites. By definition, each of these sites is different and hence the expenditure requirements will be dictated by the scale of the site, the landscape surrounding it, proximity to water courses etc.

More importantly, this area of expenditure is assessed in the context of the likelihood of fluvial/tidal flooding (i.e. from rivers and/or the sea). Fortunately this is a less serious risk for the LPN network.

LPN's need for flood mitigation arises from different sources, specifically, burst water mains and the impact of ground water resulting in flooding of the many underground substations and other installations on the London network.

The assessment model does not take account of these potential causes and hence it is perhaps no surprise that the outcome from the benchmarking is so poor for LPN.

Detailed justification for proposed expenditure on flood mitigation in LPN is provided in LPN Civils

9.3 Network operating costs (NOCs)

Network Operating Costs (NOCs) is a class of operating expenditure which relates to the day-to-day activities that impact directly on the network. These are accounted for under six headings:

- Troublecall – responding to faults and restoring the electricity supply
- ONIs – additional costs that result from responding to faults. This includes those costs which do not result in a loss of supply to households or businesses, such as street lighting faults or cut-out changes, or other miscellaneous fault-related costs, such as making abortive calls.
- Severe Weather 1-20 – the cost of restoring the network when it has been subject to an extreme weather event
- Inspection and Maintenance – inspecting our network assets and undertaking any maintenance that is required
- Tree-cutting – cutting trees and other vegetation so as to minimize the risk of interference with our network assets
- NOCs other – network-related operating costs, including the cost of electricity used in our substations for lighting/heating etc., the operating cost of generation assets based in remote locations, e.g. islands, and the cost of dismantling assets which are no longer required.

A summary of benchmarking of LPN Network Operating Costs can be found in a Table 24 below.

As troublecall benchmarks as efficient, and SW 1-20 and Tree-cutting are not relevant to LPN, detailed comments are limited to ONIs, Inspection and Maintenance and NOCs other.

Table 24 Benchmarking of Network Operating Costs - LPN

LPN	Total submitted cost (£m)	Efficiency score	volume reduction as % of total reduction	cost reduction as % of total reduction
Trouble call	144.8	93%	50%	50%
ONIs	43.4	124%	0%	100%
SW 1-20	0.0	n/a	n/a	n/a
I&M	117.9	103%	0%	100%
Tree cutting	0.1	n/a	n/a	n/a
NOCs other	24.2	110%	0%	100%
Total	**330.4**	**101%**	**-166%**	**266%**

Occurrences not incentivized (ONIs)

Description:	ONIs (previously referred to as Non Quality of Supply faults) are a class of faults which are not incentivized under the Interruptions Incentive Scheme. In many cases, they will not result in a loss of supply to an end-customer. This category also includes some areas of non-engineering cost which are attributed to the faults process, for example, the cost of abortive visits.

This category comprises of a diverse range of activities, and potentially there are problems in attempting to assess these collectively.

Historically, including at DPCR5, there have been questions about the consistency of reporting in this area leading to concerns about the reliability of any benchmarking. The range of costs and volumes reported, particularly in respect of cut-outs, for example, does suggest that some of these issues persist and hence we are wary of placing any great significance in the outcomes.

Costs of ONIs will also be adversely impacted by the difficulties of operating in a highly urban environment, with the issues of traffic congestion, utilities in the footway and the requirement for out-of-hours working being of particular concern.

Inspections and Maintenance

Description:	The cost of inspecting and maintaining network assets. This category covers a huge diversity of activities ranging from small electrical assets which may be inspected/maintained in significant volumes each year, but at relatively low cost, through to very large assets where the maintenance costs can be considerable.

The benchmarking of Inspections and Maintenance within Ofgem's assessment model is relatively simplistic, as it simply compares the cost with the overall value of the overhead and plant assets in the network, as measured using MEAV.

LPN is unique amongst the DNOs in not having an overhead network and we are somewhat doubtful that assessing costs on the same basis is appropriate, bearing in mind LPN's very different mix of assets.

The additional inspection and maintenance activity that is required in Central London, which is described as part of our Central London Network Strategy in Annex 13A: Regional cost justification, should also be taken account of when considering our proposals.

As the forecast cost for Inspections and Maintenance is only 3% more than the benchmark, and in the context of the additional I&M activity in Central London, we are confidence that this expenditure can be considered efficient.

NOCs other

Description:	This category of expenditure comprises of three very different areas which are integral to the cost of running the network, as follows: • Substation electricity - The cost of the electricity used in our operational properties, and in particular substations. This is used for lighting and heating, as well as the operation of all electrically powered devices

	• Remote location generation - The cost of operating generation equipment to assist in the distribution of electricity in remote locations, such as islands. This is typically found where the cost of providing a fully integrated link with the mainland network would be very expensive • Dismantlement - This relates to the cost of de-energising and dismantling network assets which are no longer required, and where no third party can be charged

UK Power Networks have no remote generation and costs of dismantlement are relatively small, and hence the bulk of costs within this category relate to substation electricity.

9.4 Closely associated indirects and Smart meter roll-out

This section addresses two different classes of expenditure, both of which are closely aligned with activity on the network, as follows:

- Closely Associated Indirects – the 'back office' activities that support our work on the network. Some are these are very closely related to the operation or development of the physical network, such as network design or project management. Others are more supportive in nature, e.g. call centre, operational training.
- Smart meter roll-out – this is the programme of work associated with supporting the retail supply companies in their roll-out of smart meters

Table 25 Benchmarking results for closely associated indirects and smart metering

LPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
CAI	349.0	102%	0%	100%
Smart meters	20.4	196%	0%	100%
Total	**369.4**	**104%**	**0%**	**100%**

9.4.1 Closely Associated Indirects

Closely associated indirects (CAIs) are the activities, often office-based, which support the direct operations on the network, be that day-to-day or investment.

Unlike the direct cost activities, the use of 'unit costs' is less appropriate, as it is much more difficult to identify a 'unit' of an activity, such as stores or control centre.

Statistical methods, such as regression analysis, have been used as this gives a better understanding of the confidence that can be attached to any metrics, as well as taking greater account of the impacts of economies of scale. Hence we have used this as the basis of our assessment in the following section. Table 27 provides breakdown of CAI benchmarking results

Table 26 Benchmarking results for CAIs - LPN

LPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Network Design	50.9	97%	0%	100%
Project Mgt	34.6	96%	0%	100%
EM&CS	130.7	109%	0%	100%
System Mapping	7.2	96%	0%	100%
Control Centre	33.5	89%	0%	100%
Call Centre	14.7	134%	0%	100%
Stores	11.3	109%	0%	100%
Operational Training	26.4	99%	0%	100%
Vehicles & Transport	30.8	94%	0%	100%
Network Policy	8.9	109%	0%	100%
Total	**349.0**	**102%**	**0%**	**100%**

As can be observed, LPN performs better than benchmark across most categories. At an overall level, LPN's forecast for the RIIO-ED1 period is only £5.9 million more than the benchmark of £343.1 million.

Detailed comments are limited to those categories which are deemed to be worse than benchmark.

Engineering Management and Clerical Support

Description:	Engineering Management and Clerical Support relates to the office-based activities of management and administration staff in support of those staff undertaking direct engineering activity on the network. This includes: • Strategic network business plan development • Work planning, budgeting, allocation and control • Operational performance management • Health and safety • Streetworks administration • Wayleave administration and payments • Clerical support • Business Improvement

The LPN forecast is £10.3 million higher than the benchmark of £120.4 million.

The size and diversity of expenditure which falls within this category makes it difficult to deduce what is driving this apparent inefficiency, although we note that there are some quite significant differences between the DNOs in how their spend is distributed across the various sub-categories.

UK Power Networks seems to spend far more on 'work planning, budgeting, allocation and control' than other DNOs, and hence it is possible that we are accounting for cost here, which others are including as part of their direct costs, where such functions are carried out by engineers in the field, or alternatively in indirect activities such as Project Management. Further credence may be lent to this by virtue of the fact that we benchmark as efficient on most direct activities as well as Project Management.

Call Centre

Description:	The Call Centre activity relates to the management and handling of all telephone communications with customers in respect of power outages or general enquiries. It also includes the cost of administering and paying any compensation payments due to customers.

UK Power Networks has acknowledged that its performance under the existing Customer Services incentive schemes requires improvement. As part of this response, additional investment is being made in our Customer Services operations and we anticipate that this will continue during the RIIO-ED1 period.

This expenditure is the primary reason for the poor efficiency score in this area, however we believe that it is justified in delivering our customer expectations, and is also supported through the outcomes of the Willingness to Pay research (see Process Overview).

Stores

Description:	The Stores activity relates to the management and operation of the warehouse and logistics functions.

The forecast expenditure on the Stores activity in LPN is £0.9 million higher than benchmark.

Annex 13A – Regional Cost Justification – provides further information on the additional costs that arise in delivering plant and materials into London, the most significant of which is the need to make many deliveries either directly to site on a 'just-in-time' basis, and the requirement to deliver heavy plant in particular overnight, rather than it being available as required from a local plant store.

Network Policy

Description:	Network Policy relates to the development and review of any environmental, technical and engineering policies. This also includes any research and development apart from that which is part of the Innovation Funding Incentive.

The forecast expenditure on the Network Policy activity is £0.7 million higher than benchmark.

This additional cost can be attributed to the unique design of the LPN network which brings with it greater complexity and an inability to share policy with the other 2 UKPN networks.

Smart meter roll-out (additional interventions)

In the period from 2015-2020, the DNOs will be required to support the roll-out of smart meters. Whilst not responsible for that roll-out, there will be occasions where the meter installer requires DNOs to attend site, to repair or replace existing DNO equipment in the customer's premises.

Whilst we have undertaken modelling of the likely workload that will result, it is difficult to predict the volume of such incidents; hence Ofgem has assumed an intervention rate of 2.5% in setting cost allowances, with an associated mechanism to adjust the allowance if the intervention rate proves to be either lower or higher.

Ofgem will base the allowance and operation of the uncertainty mechanism on a unit cost. This shows LPN's forecast to be close to double the benchmark.

UK Power Networks has arrived at its proposed unit costs based on a combination of analysis of existing activities where these are similar and a bottom-up build. Our experience of the costs of operating in London and specifically servicing ad-hoc requirements to visit households, suggests that the derived UK-wide unit cost is likely to seriously understate the costs of delivering this service in London.

Detailed justification of our proposed cost relating to the smart meter roll-out can be found at: Annex 10: Smart Metering

9.5 Business Support, Operational IT & Telecoms and non-operational capex

This section comprises of two distinct but related elements.

Firstly there are the costs of the corporate functions which one might find in any commercial organisation, known as Business Support costs. In Ofgem's analysis, this includes the following activities:

- HR and Non-Operational Training
- Finance & Regulation
- CEO etc.
- IT & Telecoms
- Property Management

Secondly, there are two categories of cost, which arguably could be presented in a number of places in this annex, namely:

- Operational IT& Telecoms – the capital and operational expenditure associated with the IT/telecoms systems which support the operation of the network, for example, the automation systems, control system etc.
- Non-operational capex – capital expenditure on non-network assets, such as IT, property, vehicles

Due to the close relationship with IT and Property we have opted to present these alongside the Business Support costs

Table 27 below summarises the outcome of benchmarking of these costs

Table 27 Benchmarking of Business Support, Operational IT&T and non-operational capex - LPN

LPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Business support	175.3	96%	0%	100%
Op IT&T	51.1	145%	0%	100%
Non op capex	62.1	121%	0%	100%
Total	**288.5**	**108%**	**0%**	**100%**

As indicated in section 4.1.3, we have major concerns with the method which Ofgem has adopted for the benchmarking of Business Support, but in spite of this, LPN's forecast is still some £6.6 million better than benchmark. For this reason, we have not presented any detailed discussion of these results, and instead focus our comments on Operational IT & Telecoms and Non-operational capex.

Operational IT & Telecoms

Description:	IT equipment which is used exclusively in the real time management of network assets, but which does not form part of those network assets and would include: • Substation RTU's; • Marshalling kiosks; • Receivers; • Communications for switching & monitoring • Hardware & software used for real time management of network assets

We note that LPN appears particularly inefficient, when compared with the benchmark cost for this category.

We believe that this is due to a limitation in the benchmarking which sets the overall benchmark expenditure for the ED1 period as equal to 8 times the average annual expenditure in the DPCR5 period. This has the effect of benchmarking out any increase in expenditure.

UK Power Networks was an early adopter of RTUs in its substations; however that technology is now reaching the point where it needs to be renewed. The assessment method does not take account of such a requirement.

A full justification of this expenditure is provided at: IT Strategy.

Once this is taken into account we believe that our expenditure will be deemed to be efficient.

Non-operational capital expenditure

Description:	Expenditure on new and replacement assets which are not system assets, as follows: • Vehicles - purchase of the commercial vehicle fleet and mobile plant/generation utilised by the DNO or any other related party for the purposes of providing services to the DNO • Plant & machinery • Small tools & equipment • Office equipment • Non-operational properties • Non-operational IT

This includes capital expenditure on a diverse range of items, ranging from hand tools to refurbishment of office buildings or investments in new IT systems.

At an overall level, Ofgem's assessment results in a benchmark expenditure which is £10.9 million less than the EPN forecast.

As described in section 4.1.3, UK Power Networks have considerable concerns about the method which has been applied to benchmark such costs. As such we stand by the costs that are presented in our business plan and are confident that these are fair and reasonable.

We would also propose that, as at DPCR5, Ofgem commissions external specialists to examine proposed expenditure on property and IT.

10 SPN – Disaggregated Benchmarking

10.1 Summary

A summary of the results of the assessment of the SPN business plan is presented in Table 28 below. In the following sections, the categories of expenditure highlighted are broken down to provide a more detailed assessment of the activities of which they are comprised

At a totex level, the disaggregated cost assessment model produces a benchmark cost of £1,887.1million. Our business plan proposal of £1,867.9 million is £19.3 million less than this value, and therefore we would argue that it is demonstrably efficient.

Also, it is worth highlighting that the assessment model identifies £19.8 million of inefficiency in respect of our forecast volumes. In the supporting documentation within this business plan, we have provided extensive written justifications of the capital expenditure in particular that is required, and hence we expect Ofgem to acknowledge that the volume gap that their model identifies can in fact be explained.

On that basis, SPN will benchmark as being significantly better than benchmark and we have no hesitation in stating that this plan is efficient, and will offer excellent value to customers.

Table 28 Overall summary of benchmarking - SPN

SPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Load CAPEX	322.6	90%	2%	98%
Non load CAPEX	380.4	110%	86%	14%
other CAPEX	99.4	95%	-34%	134%
NOCs	366.9	95%	62%	38%
CAI & Smart-metering	409.3	98%	0%	100%
BS & non Op CAPEX	289.2	105%	0%	100%
Total	**1867.9**	**99%**	**-103%**	**203%**

10.2 Network capital expenditure

Introduction

Network capital expenditure accounts for approximately 43% of the proposed expenditure in the SPN business plan.

This is the physical investment we will make in the network itself and the supporting infrastructure, which is required for its operation such as the buildings to house it.

For clarity, it is broken down into three sections:

- Load-related: investment driven by demand or external requirements
- Non-load related: investment driven by the condition of assets or legal, safety or regulatory requirements
- Other: investment required as a result of specific initiatives or in other elements other than network assets

LOAD-RELATED CAPITAL EXPENDITURE

'Load-related' expenditures are driven by an increasing requirement for electricity, either as a result of a rise in the general demand or a large development that increases the demand at a specific point, e.g. a new housing estate or commercial building. Also included within this category are Diversions, which are external requirements for changes to the network, e.g. the need to move equipment as a result of a road scheme.

There is a significant challenge with benchmarking much of load-related capital expenditure because the volumes, mix and complexity of work will be specific to the circumstances or external drivers faced by each individual DNO. By definition, this has the scope to significantly impact on the proposed costs.

Table 29 provides a summary of the outcomes from the benchmarking of load related capital expenditure. This shows that EPN is significantly better than benchmark in respect of the proposed load-related capital expenditure, with a benchmark cost of £360.5 million, compared with the proposal of £322.6 million.

Discussion in the following sections is limited to Reinforcement, being the only category which benchmarks as inefficient.

Table 29 Benchmarking of load related Capital Expenditure – SPN

SPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Connections	22.4	77%	0%	100%
Diversions	60.9	99%	0%	100%
Reinforcement	184.2	104%	523%	-423%
TCP	23.3	94%	0%	100%
HVP	31.8	47%	61%	39%
Total	**322.6**	**90%**	**2%**	**98%**

Reinforcement

Description:	Reinforcement is enhancement to the network to address an existing constraint or to facilitate growth in load or generation. To aid understanding, expenditure on reinforcement is further broken down to reflect the different reasons underlying the need to reinforce.

We note that the Ofgem assessment model benchmarks our proposed reinforcement expenditure as being close to efficient with our proposed expenditure being £7.3 million more than the benchmark of £176.9 million.

The requirements for reinforcement will be specific to each DNO, as they are driven by growth in the load on the network. In many cases, the only way to assess this area of expenditure is through consideration of the actual schemes proposed so as to judge whether the case has been made for undertaking them, and that the solution proposed is the most efficient available.

We have prepared a written 'scheme paper' for each reinforcement project which defines the requirement, the various options that have been considered and the solution we have arrived at. These are further supported by cost benefit analysis as appropriate.

On that basis, we believe that we can answer the question raised by the model, in respect of our expenditure, and that following review of the scheme papers, this area of expenditure can be considered efficient.

The justification for these categories can be found in SPN's load related asset plan.

NON- LOAD RELATED CAPITAL EXPENDITURE

'Non-load related' expenditures are driven by the condition of the network.

This falls into two main categories:

- expenditure to either replace an asset which has reached the end of its life or, alternatively, extend the life of assets through the replacement of significant components or sub-systems (refurbishment).
- expenditure which is driven by a legal, safety or regulatory requirement, for example, ensuring that overhead lines provide sufficient clearance.

Of the non-load categories, asset replacement dominates, accounting for over 75% of the total expenditure. Unlike much of the capital expenditure, this is one area that is more suited to the kind of benchmarking represented by Ofgem's assessment model.

This is because, at the lower voltages in particular, tasks are relatively standardised and hence a unit-cost approach is a reasonable method for assessing cost efficiency. However volume efficiency requires a more considered approach, taking into account the health of the assets.

Table 30 provides a summary of the results from the benchmarking of non-load related capital expenditure. This shows that SPN is significantly worse than benchmark in respect of the proposed non load-related capital expenditure, with a benchmark cost of £345.1 million, compared with the proposal of £380.4 million.

Ofgem's model suggests that slightly more than 85% of the difference is due to unnecessary volume being proposed with the remainder a result of inefficient unit costs. This assessment is further discussed for each of the categories.

Table 30 Benchmarking of non- load related Capital Expenditure - SPN

SPN	Total submitted cost (£m)	Efficiency score	volume reduction as % of total reduction	cost reduction as % of total reduction
ESQCR	28.0	93%	100%	0%
Asset replacement	291.7	112%	60%	40%
Refurbishment	25.1	120%	57%	43%
Legal & safety	35.6	103%	0%	100%
Total	**380.4**	**110%**	**86%**	**14%**

Asset replacement

Description:	Asset replacement refers to the expenditure undertaken in replacing existing assets or dismantling assets in the process of replacement. The requirement to replace an asset is typically driven by the condition of the asset, or a concern over safety or environmental impact.

Asset replacement accounts for £32.0 million of the £35.5 million of apparent inefficiency within our proposals for non load-related capex.

Over 90% of this £32.0 million (£29.9 million) is a consequence of the assessment of volumes proposed. Our proposed volumes are the product of a sophisticated condition-based forecasting process and hence we are confident that they are appropriate.

The remaining £2.1 million relates to cost efficiency. In its model, Ofgem has judged cost efficiency by reference to a set of unit costs provided by its advisors. We have not had access to the detail of this advice, but we would have particular concerns about a generic set of unit costs being applied irrespective of the context. We would argue that this challenge in respect of cost efficiency could easily fall within the boundaries within the model.

Ofgem should refer to the detailed justification of both costs and volumes which is provided at the relevant annexes, supplemented where appropriate, by CBAs and scheme papers

We also note that the bulk of our cost efficiency challenge is stems from the assessment of replacement costs at the higher voltages. Projects at the higher voltages tend to be the most complex, and costs can be heavily impacted by their context, for example, there may be requirements for supporting works to ensure supply is maintained whilst old equipment is being replaced. Hence in our view these classes of assets are least suited to a simple unit cost assessment.

In summary, we would argue that the use of a mechanistic approach, such as that which is embodied in this model should only ever form a small part of the assessment process. Ofgem should place much greater reliance on the written justifications provided in the business plan, together with the outcomes of discussion with the DNO. On that basis, we are confident that Ofgem will find our proposals to be efficient.

Refurbishment

Description:	A one-off activity undertaken on an asset that is deemed to be close to end of life, or is otherwise not fit for purpose, that extends the life of that asset or restores its functionality. Refurbishment can include the replacement or reconditioning of components of an asset,

	but is distinct from ongoing maintenance of assets.

The benchmarking of refurbishment suggests that the forecast in the SPN business plan is £4.2 million higher than the benchmark cost of £20.9 million.

The capture of refurbishment costs was a new requirement for DPCR5 and hence there is relatively little historic data upon which to base an assessment. What is more, past experience indicates that it can take a number of years before true consistency of reporting is established amongst the DNOs. This is made all the more likely, as the scope of refurbishment tasks is extremely diverse, from something as superficial as external repairs to an item to a full-scale renovation of an asset performed away from site.

For these reasons, we believe that it is important that Ofgem takes a more rounded view of the assessment of refurbishment and does not rely on the outcomes of the model.

Legal and Safety

Description:	The Legal and Safety category encompasses the costs of any investment or intervention where the primary motivation is to protect the staff and the public, and to ensure adherence with safety standards. It is broken down into a number of sub-categories, as follows: • Site security • Asbestos management • Safety climbing fixtures • Fire protection • Earthing upgrades • Metal theft remedial work • Other costs areas specified by the DNO

We note that our proposed cost is £1.1 million higher than the benchmark cost of £34.5 million.

On inspection of the model, it would appear that this is due to a poor result in the benchmarking of site security for EHV substations. We would argue that the cost of such measures will be highly site-specific, and particularly on these larger installations.

Hence we would refer Ofgem to our written justifications on Legal and Safety and anticipate that this will demonstrate the efficiency of our proposals.

'OTHER' CAPITAL EXPENDITURE

The remaining capital expenditure, accounting for around 12% of the total capex, is made up of a number of diverse activities, some of which are driven by a specific initiative, such as black-start, or are simply associated with the operation of the network, for example, flood protection.

The summary of benchmarking results from Ofgem's assessment model can be found in Table 31 below.

Table 31 Benchmarking of 'other' Capital Expenditure - SPN

SPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Civil works	45.0	108%	41%	59%
QoS	0.0	n/a	n/a	n/a
Flooding	3.9	67%	500%	-400%
BT21CN	18.3	390%	0%	100%
Technical losses & other environ	2.9	93%	0%	100%
HILP	0.0	n/a	n/a	n/a
CNI	9.3	93%	0%	100%
Black Start	3.4	73%	-11%	111%
Rising Mains & Laterals	16.6	57%	0%	100%
Total	**99.4**	**95%**	**-34%**	**134%**

We are pleased to note that on an overall basis, SPN benchmarks as efficient in respect of 'Other' capex.

Detailed comments are provided below for the two categories that appear inefficient.

Civils

Description:	Civil engineering work associated with DNO network assets, including buildings and site works at substations.

Civil works is the single largest category within 'other' capital expenditure, accounting for c.45% of the total. The benchmarking model suggests that the benchmark cost should be £41.5 million, as opposed to the SPN forecast of £45.0 million. This difference is evenly split between cost and volume efficiency.

On inspection of the model, it would appear that SPN's inefficiency in costs is driven by the costs of civil work associated with asset replacement in our higher voltage installations. We would argue that the these larger facilities are likely to result in highly site-specific costs, and by definition are least suitable to a simple unit-cost type comparison

Furthermore, we believe that our volumes are fully justified in the supporting documentation and scheme papers.

On that basis we are confident that our civil costs are efficient.

BT 21st Century (BT21CN):

Description:	Expenditure designed to mitigate against changes in the BT network which might impact on a DNOs ability to communicate, in real-time, with its equipment based in substations.

The Ofgem assessment model judges our expenditure proposals to be massively inefficient. We would argue that the assessment model is flawed in this area, as it seeks to limit companies to an annual spend which is no greater than that spent during the DPCR5 period.

Actual and total forecast BT21CN costs and volumes in DPCR5 are ahead of the DPCR5 agreed plan with additional volume having being delivered at a lower cost than allowed.

Our proposed expenditure on BT21CN will be required during the RIIO-ED1 period, and hence to refuse it on the basis of our level of expenditure in DPCR5 is simply not rational.

Detailed justification for proposed UK Power Networks expenditure is provided in Non Load Asset Plan SPN: BT21

We believe that this demonstrates that our expenditure proposals are prudent and efficient.

10.3 Network operating costs (NOCs)

Network Operating Costs (NOCs) is a class of operating expenditure which relates to the day-to-day activities that impact directly on the network. These are accounted for under six headings:

- Troublecall – responding to faults and restoring the electricity supply
- ONIs – additional costs that result from responding to faults. This includes those costs which do not result in a loss of supply to households or businesses, such as street lighting faults or cut-out changes, or other miscellaneous fault-related costs, such as making abortive calls.
- Severe Weather 1 in 20 – the cost of restoring the network when it has been subject to an extreme weather event
- Inspection and Maintenance – inspecting our network assets and undertaking any maintenance that is required
- Tree-cutting – cutting trees and other vegetation so as to minimize the risk of interference with our network assets
- NOCs other – network-related operating costs, including the cost of electricity used in our substations for lighting/heating etc., the operating cost of generation assets based in remote locations, e.g. islands, and the cost of dismantling assets which are no longer required.

A summary of benchmarking of SPN Network Operating Costs can be found in Table 32 below.

Table 32 Benchmarking results for Network Operating Costs

SPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Trouble call	157.9	91%	50%	50%
ONIs	39.8	105%	0%	100%
SW 1-20	6.3	93%	0%	100%
I&M	73.8	100%	0%	100%
Tree cutting	68.8	89%	50%	50%
NOCs other	20.3	119%	0%	100%
Total	**366.9**	**95%**	**62%**	**38%**

We note that SPN benchmarks as efficient, with a submitted cost £18.4 million better than the benchmark.

Detailed discussion of the two categories which are deemed inefficient is provided below

Occurrences not incentivized (ONIs)

Description:	ONIs (previously referred to as Non Quality of Supply faults) are a class of faults which are not incentivized under the Interruptions Incentive Scheme. In many cases, they will not result in a loss of supply to an end-customer. This category also includes some areas of non-engineering cost which are attributed to the faults process, for example, the cost of abortive visits.

This category comprises of a diverse range of activities, and potentially there are problems in attempting to assess these collectively.

Historically, including at DPCR5, there have been questions about the consistency of reporting in this area leading to concerns about the reliability of any benchmarking. The range of efficiency scores reported, particularly in respect of cut-outs, for example, does suggest that some of these issues persist and hence we are wary of placing any great significance in the outcomes.

The SPN benchmark is £2.0 million less than our forecast of almost £40 million – due to the uncertainties associated with the reporting, we believe that this falls within the bounds of efficiency.

NOCs other

Description:	This category of expenditure comprises of three very different areas which are integral to the cost of running the network, as follows: • Substation electricity - The cost of the electricity used in our operational properties, and in particular substations. This is used for lighting and heating, as well as the operation of all electrically powered devices • Remote location generation - The cost of operating generation equipment to assist in the distribution of electricity in remote locations, such as islands. This is typically found where the cost of providing a fully integrated link with the mainland network would be very expensive • Dismantlement - This relates to the cost of de-energising and dismantling network assets which are no longer required, and where no third party can be charged

UK Power Networks have no remote generation and costs of dismantlement are relatively small, and hence the bulk of costs within this category relate to substation electricity.

10.4 Closely associated indirects and Smart meter roll-out

This section addresses two different classes of expenditure, both of which are closely aligned with activity on the network, as follows:

- Closely Associated Indirects – the activities that support our work on the network. Some are these are very closely related to the operation or development of the physical network, such as network design or project management. Others are more supportive in nature, e.g. call centre, operational training.
- Smart meter roll-out – this is the programme of work associated with supporting the retail supply companies in their roll-out of smart meters

Table 33 Benchmarking results for closely associated indirects and smart metering expenditures - SPN

SPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
CAI	395.3	98%	0%	100%
Smart meters	14.0	99%	0%	100%
Total	409.3	98%	0%	100%

We are pleased to note that both CAIs and Smart Metering roll-out costs benchmark as efficient.

10.4.1 Closely Associated Indirects

Closely associated indirects (CAIs) are the activities, often office-based, which support the direct operations on the network, be that day-to-day or investment.

Unlike the direct cost activities, the use of 'unit costs' is less appropriate, as it is much more difficult to identify a 'unit' of an activity, such as stores or control centre.

Statistical methods, such as regression analysis, have been used as this gives a better understanding of the confidence that can be attached to any metrics, as well as taking greater account of the impacts of economies of scale. Hence we have used this as the basis of our assessment in the following section. Table 34 provides breakdown of CAI benchmarking results

Table 34 Benchmarking results for CAIs – SPN

SPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Network Design	32.6	84%	0%	100%
Project Mgt	33.2	83%	0%	100%
EM&CS	156.7	106%	0%	100%
System Mapping	10.2	83%	0%	100%
Control Centre	39.3	88%	0%	100%
Call Centre	14.3	132%	0%	100%
Stores	12.4	107%	0%	100%
Operational Training	37.4	109%	0%	100%
Vehicles & Transport	56.7	93%	0%	100%
Network Policy	2.2	107%	0%	100%
Total	**395.3**	**98%**	**0%**	**100%**

As can be observed, SPN's efficiency varies across the different categories of indirect cost, however on an overall basis, SPN's forecast for the RIIO-ED1 period is £8.3 million better than benchmark.

For this reason, we have limited our detailed comments to those categories which appear inefficient.

Engineering Management and Clerical Support

Description:	The Call Centre activity relates to the management and handling of all telephone communications with customers in respect of power outages or general enquiries. It also includes the cost of administering and paying any compensation payments due to customers.

The SPN forecast is £8.9 million higher than the benchmark of £147.8 million.

The size and diversity of expenditure which falls within this category makes it difficult to deduce what is driving this apparent inefficiency, although we note that there are some quite significant differences between the DNOs in how their spend is distributed across the various sub-categories.

UK Power Networks seems to spend far more on 'work planning, budgeting, allocation and control' than other DNOs, and hence it is possible that we are accounting for cost here, which others are including as part of their direct costs, where such functions are carried out by engineers in the field, or alternatively in indirect activities such as Project Management. Further credence may be lent to this by virtue of the fact that we benchmark as efficient on most direct activities as well as Project Management.

Call Centre

Description:	The Call Centre activity relates to the management and handling of all telephone communications with customers in respect of power outages or general enquiries. It also includes the cost of administering and paying any compensation payments due to customers.

UK Power Networks has acknowledged that its performance under the existing Customer Services incentive schemes requires improvement. As part of this response, additional investment is being made in our Customer Services operations and we anticipate that this will continue during the RIIO-ED1 period.

This expenditure is the primary reason for the poor efficiency score in this area, however we believe that it is justified in delivering our customer expectations, and is also supported through the outcomes of the Willingness to Pay research (see Process Overview).

Stores

Description:	The Stores activity relates to the management and operation of the warehouse and logistics functions.

The forecast expenditure on the Stores activity in SPN is £0.8 million higher than benchmark.

Operational Training

Description:	Operational Training encompasses all expenditure associated with the delivery of training to the operational workforce. This includes both the delivery of classroom and on-the-job training, trainers and course materials, training facilities and training administration. Also this category includes Workforce Renewal, which involves the recruitment and training of new staff, and the further development of existing staff, to replace leavers from the operational workforce.

The forecast expenditure on Operational Training (including Workforce Renewal) is £3.0 million higher than benchmark. This is difficult for us to explain as our other two DNOs both benchmark as efficient for this activity.

As the same underlying assumptions have been used in our forecast, and a single function, operating a unified process, will be responsible for delivery, we can only interpret this as a flaw within the model.

Network Policy

Description:	Network Policy relates to the development and review of any environmental, technical and engineering policies. This also includes any research and development apart from that which is part of the Innovation Funding Incentive.

The forecast expenditure on the Network Policy activity is £0.1 million higher than benchmark.

This difference is so small that we believe it can be considered to be within the error in the model.

10.5 Business Support and non-operational capex

This section comprises of two distinct but related elements.

Firstly there are the costs of the corporate functions which one might find in any commercial organisation, known as Business Support costs. In Ofgem's analysis, this includes the following activities:

- HR and Non-Operational Training
- Finance & Regulation
- CEO etc.
- IT & Telecoms
- Property Management

Secondly, there are two categories of cost, which arguably could be presented in a number of places in this annex, namely:

- Operational IT& Telecoms – the capital and operational expenditure associated with the IT/telecoms systems which support the operation of the network, for example, the automation systems, control system etc.
- Non-operational capex – capital expenditure on non-network assets, such as IT, property, vehicles

Due to the close relationship with IT and Property we have opted to present these alongside the Business Support costs

Table 35 below summarises the outcome of benchmarking of these costs

Table 35 Benchmarking of Business Support, Operational IT&T and non-operational capex - SPN

SPN	Total submitted cost (£m)	Efficiency score	volume reduction % of total reduction	cost reduction % of total reduction
Business support	179.6	95%	0%	100%
Op IT&T	36.8	170%	0%	0%
Non op capex	72.8	114%	0%	100%
Total	289.2	105%	0%	100%

As indicated in section 4.1.3, we have major concerns with the method which Ofgem has adopted for the benchmarking of Business Support, but in spite of this, SPN's forecast is still some £9.5 million better than benchmark.

For this reason, we have not presented any detailed discussion of these results, and instead focus our comments on Operational IT & Telecoms and Non-operational capex.

Operational IT & Telecoms

Description:	IT equipment which is used exclusively in the real time management of network assets, but which does not form part of those network assets and would include: • Substation RTU's; • Marshalling kiosks; • Receivers; • Communications for switching & monitoring • Hardware & software used for real time management of network assets •

We note that SPN appears particularly inefficient, when compared with the benchmark cost for this category.

We believe that this is due to a limitation in the benchmarking which sets the overall benchmark expenditure for the ED1 period as equal to 8 times the average annual expenditure in the DPCR5 period. This has the effect of benchmarking out any increase in expenditure.

UK Power Networks was an early adopter of RTUs in its substations; however that technology is now reaching the point where it needs to be renewed. The assessment method does not take account of such a requirement.

A full justification of this expenditure is provided at: IT Strategy.

Once this is taken into account we believe that our expenditure will be deemed to be efficient.

Non-operational capital expenditure

Description:	Expenditure on new and replacement assets which are not system assets, as follows: • Vehicles - purchase of the commercial vehicle fleet and mobile plant/generation utilised by the DNO or any other related party for the purposes of providing services to the DNO • Plant & machinery • Small tools & equipment • Office equipment • Non-operational properties • Non-operational IT •

This includes capital expenditure on a diverse range of items, ranging from hand tools to refurbishment of office buildings or investments in new IT systems.

At an overall level, Ofgem's assessment results in a benchmark expenditure £9.2 million less than the SPN forecast.

As described in section 4.1.3, UK Power Networks have considerable concerns about the method which has been applied to benchmark such costs. As such we stand by the costs that are presented in our business plan and are confident that these are fair and reasonable.

We would also propose that, as at DPCR5, Ofgem commissions external specialists to examine proposed expenditure on property and IT.

11 Appendices

A.1. Errors in fast-track assessment model

The following errors were identified in the fast-track assessment model and have been reported to Ofgem:

Table 36 Errors identified in Ofgem fast-track assessment model

Id	Workbook	Worksheet	Cell refs	Issue
UKPN01	Inputs_Outputs_EPN-04122013-1	I&M	O33-U33	Formula error: All cells are linked to cell C19 in the I&M supporting file which is the adjustment for 2010/11. They should in fact be linked to cells D19-J19 representing the adjustment for the relevant year.
UKPN02	CAI_Operational_training_supportig	Vol NWFR Employees	AF26-AR44	Data error: this table seems to populate the number of employees in every year using the 2013 value of FTEs. Is this correct?
UKPN03	Asset_replacement_supporting_file	CV3 - all DNOs	ES163-ES173	Method error: A new UCI is calculated for certain grouped assets, using industry total volumes as a weighting for each asset. If a DNO's replacement activity is weighted towards the higher cost assets, this can result in them appearing inefficient against the composite UCI, even where it is efficient at an individual asset level. Each DNO needs to have its own composite UCI which reflects its particular mix of work, otherwise Ofgem will be skewing this analysis towards DNOs replacing lower cost assets.
UKPN04	SW 1-20 supporting file	Setting allowances	C74-J87	Possible method error: the gross forecast cost for each year in ED1 appears to be calculated by taking the 2012/13 reported cost and dividing by 8 (cell P10/8). This presupposes that the DNO had a 1-20 event in this year. Should this calculation in fact take account of all costs reported in DPCR5 to set the annual forecast for ED1?
UKPN05	I&M_supporting_file	MEAV	E130-E147	Error: An 'OHL+plant MEAV' is derived for each DNO by summing 25% of the OHL MEAV and 75% of the plant and equipment MEAV. This is then used in the analysis(2) tab to benchmark the proposed I&M spend. This 25:75 ratio to all DNOs, including LPN, even though LPN does not have an OHL network. Due to the use of the 25:75 ratio, the LPN 'OHL+plant MEAV' calculated is equal to only 75% of the plant MEAV, whereas it should equal 100% of the plant MEAV. In summary, as an easy fix, the OHL+plant MEAV for LPN should simply be set to the plant MEAV