Document 22
Asset Category – Tree Cutting
SPN

Asset Stewardship Report 2014

Ian Draper

Approved by Richard Wakelen / Barry Hatton

Approved date 06/03/2014

Document History

Version	Date	Details	Originator	Revison Class	Section Update
1.0	12.022014	Original	N/A	N/A	N/A
1.1	21/02/2014	Re-Submission First Draft. Trees extracted from document 14 (I&M Faults and Trees) and set up as a separate document. Several consequential text changes.	Ian Draper	Minor	Multiple sections
1.2	28/02/2014	Aligned to Gold check list	Ade Olatunji	Minor	Multiple sections
1.3	03.03.2014	Comments from RW incorporated Typographical changes Text added for clarity Table removed	Ian Draper	Minor	Preface, 1.2, 1.3, 1.4, 1.5, 1.7 (Now 2.0), 4.1, 5.0, 6.0, 7.1, 7.2, 8.0, Appx 10. Table 1, Table 2, Appx 8, Appx 9 Appx 8
1.4	05.03.2014	Amendments following comments from BH Typographical changes and text added for clarification.	Ian Draper	Minor	1.4, Appx 10
2.0	06.03.2014	ASR approved by BH and version set to 2.0	Ian Draper	Minor	Doc History and headers

Preface

UK Power Networks uses Asset Stewardship Reports ('ASR') to describe the optimum asset management strategy and proposals for different groups of assets. This optimised asset management strategy and plan details the levels of investment required and the targeted interventions and outputs needed. Separate ASRs define the most efficient maintenance and inspection regimes needed and all documents detail the new forms of innovation which are required to maximise value, service and safety for all customers and staff throughout the ED1 regulatory period. Outline proposals for the ED2 period are also included.

Each DNO has a suite of approximately 20 ASR's. Although asset policy and strategy is similar for the same assets in each DNO the detailed plans and investment proposals are different for each DNO. There are also local issues which must be taken into account. Accordingly each DNO has its own complete set of ASR documents.

A complete list of titles of the ASR's, a summary of capex and opex investment is included in '**Document 20: Asset Stewardship Report: Capex/Opex Overview'**. This document also defines how costs and outputs in the various ASR's build up UK Power Networks 'NAMP' (Network Asset Management Plan) and how the NAMP aligns with Ofgem's ED1 RIGs tables and row numbers.

Where 'HI' or asset 'Health Index' information is included please note predicted ED1 profiles are before any benefits from 'Load driven investment.'

This ASR has also been updated to reflect the feedback from Ofgem on our July 2013 ED1 business plan submission. Accordingly to aid the reader three additional appendices have been added. They are;

1. **Appendix 8 - Output NAMP/ED1 RIGS reconciliation:** This section explains the 'line of sight' between the UKPN Network Asset Management Plan (NAMP) and the replacement volumes contained in the Ofgem RIGS tables. The NAMP is the UKPN ten year rolling asset management investment plan. It is used as the overarching plan to drive both direct and indirect Capex and Opex interventions volumes and costs. The volume and cost data used in this ASR to explain our investment plan is taken from the UK Power Networks NAMP. Appendix 8 explains how the NAMP outputs are translated into the Ofgem RIGS tables. The translation of costs from the NAMP to the ED1 RIGS tables is more complex and it is not possible to explain this in a simple table. This is because the costs of a project in the 'NAMP' are allocated to a wide variety of tables and rows in the RIGS. For example the costs of a typical switchgear replacement project will be allocated to a range of different Ofgem ED1 RIGs tables and rows such as CV3 (Replacement), CV5 (Refurbishment) CV6 (Civil works) and CV105 (Operational IT Technology and Telecoms). However guidance notes of the destination RIGs tables for NAMP expenditure are included in the table in the Section 1.1 of the Executive Summary of each ASR.

2. **Appendix 9 – Efficiency benchmarking with other DNO's:** This helps to inform readers how UK Power Networks is positioned from a benchmarking position with other DNO's. It aims to show why we believe our investment plans in terms of both volume and money is the right answer when compared to the industry, and why we believe our asset inspection and intervention proposals are efficient and effective and in the best interest for our customers.

3. **Appendix 10 – Material changes since the July 2013 ED1 submission:** This section shows the differences between the ASR submitted in July 2013 and the ASR submitted for the re-submission in March 2014. It aims to inform the reader the changes made to volumes and costs as a result of reviewing the plans submitted in July 2013. Generally the number of changes made is very small, as we believe the original plan submitted in July 2013 meets the requirements of a well justified plan. However there are areas where we have identified further efficiencies and improvements or recent events have driven us to amend our plans to protect customer safety and service.

We have sought to avoid duplication in other ED1 documents, such as 'Scheme Justification Papers', by referring the reader to key issues of asset policy and asset engineering which are included in the appropriate ASR documents.

Contents

1.0 Executive Summary Tree Cutting

1.1 Scope

This Tree Cutting Asset Stewardship Report describes the management of vegetation in the vicinity of overhead lines to minimise the effect of trees on the network. The "tree cutting" umbrella encompasses various activities including inspections/surveys, tree cutting, trimming and/or felling, and resilience management. It also includes ancillary costs such as preparing and carrying out shutdowns, replanting trees, compensation payments, etc.

This document presents a re-submission of the July 2013 proposals for the ED1 period, including additional appendices to show alignment between the documented tables and the RIGs tables (Appendix 8 – Output NAMP/ED1 RIGS Business Plan Data Table Reconciliation), and benchmarking against other DNOs (Appendix 9 – Efficiency Benchmarking). A summary of the main changes between this and the original July 2013 submission is included in Appendix 10 – Material Changes Since July 2013 ED1 Submission.

The proposals for tree cutting were previously included in document 14 – I&M, Faults and Trees, but have been separated out for ease of reference. This document covers the volumes for DPCR5 and the forecast for the remainder of DPCR5 and ED1 periods. It is expected that ED2 volumes will continue at a similar level to that for ED1.

1.2 Strategy

The strategy for tree cutting is to ensure vegetation around overhead lines is managed in order to keep the risks to the network and the general public, as well as overall costs, as low as reasonably practical.

Tree cutting will be managed through the deployment of contractors and in-house staff to maintain cutting to ENA Technical Specification 43-8 (horizontal and vertical clearances) and to achieve a more resilient network as required by ENA Technical Recommendation ETR132 (Network Resilience) of the ESQCR 2006.

The overall strategy for ED1 is to manage, at the lowest cost, a steady state position with clearances remaining compliant, except where refusals prevent this being achieved, across the period. This approach is based on anticipated vegetation growth and historic reporting, combined with local knowledge and experience and depends on consents from land-owners being granted. The proposed approach manages any change in risk.

The forecast figures for tree cutting and inspection volumes have been derived from Table "O" (Volumes) from the 19th February 2014 NAMP, covering from 2013/14 to 2022/23, which in turn are based on overall network route lengths.

Asset volumes and network statistics have been taken from the RIGS V1 return (2013) in km and converted to spans where appropriate. These cover total circuit lengths.

1.3 ED1 Proposals

The rationale for tree cutting is outlined below:

Tree Cutting will continue in alignment with existing policies in order to maintain statutory clearances.

It is proposed that the full network will be surveyed and inspected in accordance with the cyclic cutting and inspection regime. Tree trimming will be carried out where appropriate, based on the results of the surveys, faults, or in response to customer information (reactive cutting).

An allowance has been included in ED1 for achieving resilience compliance with ETR132 in a progressive and efficient way.

1.4 Summary Table of ED1 investment

	DPCR5					RIIO-ED1									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	DPCR5	ED1
	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	Average	Average
LV Cut	2.82	2.48	2.78	3.05	2.48	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56	2.72	3.56
LV Inspect	0.03	0.03	0.03	0.20	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.09	0.15
HV Cut	3.50	3.90	3.57	1.52	2.94	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	3.08	2.98
HV Inspect	0.11	0.12	0.11	0.08	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.12	0.17
EHV Cut	0.92	1.02	1.00	0.91	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.93	0.81
EHV Inspect	-	-	-	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.05	0.11
132kV Cut	0.26	0.22	0.47	0.36	0.36	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.34	0.37
132kV Inspect	0.00	0.00	0.00	0.04	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.02	0.07
Cut & Inspect Total	**7.65**	**7.77**	**7.96**	**6.29**	**7.08**	**8.21**	**8.21**	**8.21**	**8.21**	**8.21**	**8.21**	**8.21**	**8.21**	**7.35**	**8.21**
ETR132 (HV)	-	-	-	0.02	-	0.11	0.22	0.32	0.41	0.52	0.52	0.52	0.52		
ETR132 (EHV)	-	-	-	-	-	0.02	0.03	0.04	0.05	0.11	0.11	0.11	0.11		
ETR132 (132kV)	-	-	-	-	-	-	-	-	-	-	-	-	-		
ETR132 Total	**-**	**-**	**-**	**0.02**	**-**	**0.13**	**0.24**	**0.36**	**0.47**	**0.63**	**0.63**	**0.63**	**0.63**		
Trees Total	**7.65**	**7.77**	**7.96**	**6.31**	**7.08**	**8.33**	**8.45**	**8.57**	**8.67**	**8.84**	**8.84**	**8.84**	**8.84**		

Table 1- Summary Expenditure Table (£m). Source RIGs 2012/2013.

As a consequence of the demographics within the SPN region, the average ED1 annual expenditure has increased over DPCR5 to reflect increased customer driven tree cutting costs (at LV) and higher tree density.

ETR132 expenditure has also increased as a consequence of aligning the UCI to the DTI guidance figure.

.

1.5 Innovation

For tree cutting, UKPN are always looking to new processes for improving line clearances and compliance with the regulations. Combined tree cutting surveys and overhead line safety patrols will be assessed. Improved techniques to achieve resilience in accordance with ETR132 are also being investigated (6.0).

1.6 Risks and Opportunities

	Description of similarly likely opportunities or risks arising in ED1 period	**Uncertainties**
Opportunity	Overcoming skilling and scheduling issues to allow some combination of routine overhead line patrols with tree cutting survey work (LV).	-£30k per annum
Risk	Allowance for ETR132 compliance insufficient for additional permissions and consent requirements	+£60k per annum
Risk	ETR132 resilience work may be required at 132kV in addition to HV and EHV.	+£80k per annum
Risk	Efficiency target of 5% on contract rates may not be achievable.	+£400k per annum

Table 2: Risk and Opportunities

2.0 Description of Tree Cutting

Tree cutting and vegetation clearance is a critical activity in the overhead areas of UKPN's network in order to keep tree related unplanned outages to a minimum and to meet ESQCR statutory obligations.

Approximately 4% of all faults, and 28% of overhead line faults that occur in SPN, are due to growing or falling trees (not felled), thereby contributing to Customer Interruptions (CIs) and Customer Minutes Lost (CMLs). This percentage increases significantly during severe weather conditions.

In order to improve network resilience in extreme weather conditions, ESQC Regulation 20A, documented in more detail in the Engineering Networks Association Technical Report No 132 (ETR 132), requires UKPN to achieve network resilience (i.e. tree cutting/management to prevent supply interruptions) over 20% of its entire overhead line network by 31/01/2034.

2.1 Asset Information

The overhead network in SPN comprises of the following:

Overhead Line Voltage	Network Length in km
132kV	722 (1,161 kilometres is reduced to 722 as route length is used for tree cutting)
33kV	1,218
HV	5,587
LV	4,543

Table 3 - Asset Information. Source: RIGs return 2013.

2.2 Tree cutting cycles

UKPN follows a proactive vegetation management regime based on a cyclic programme as follows:

Overhead Line Voltage	Cycle in Years
132kV	1
33kV	1
HV	3
LV	4

Table 4 - Tree cutting cycles. Source: Tree cutting contracts.

2.3 Vegetation Density

According to the Forestry Commission National Inventory of Woodland and Trees, Surrey and Sussex have some of the highest density of tree growth in England. Predictions for climate change show that this area will see the first effects of increased growth rates in the UK, and will require monitoring of cut rates to determine if cutting cycles need to be reviewed to manage this. Although the data below is from 1998 it is still pertinent today and indicates the higher challenges UK Power Networks faces in these areas, to achieve compliance to standards, than elsewhere in England. The Forestry Commission document shows density increasing from surveys that started in 1895 in Surrey and Sussex, and given the present emphasis on trees in the environment this is likely to continue. The forecast is based on historic performance, the routeing of overhead lines, and experience. The percentage of spans requiring tree cutting in SPN varies from 30% to 60% depending on the voltage.

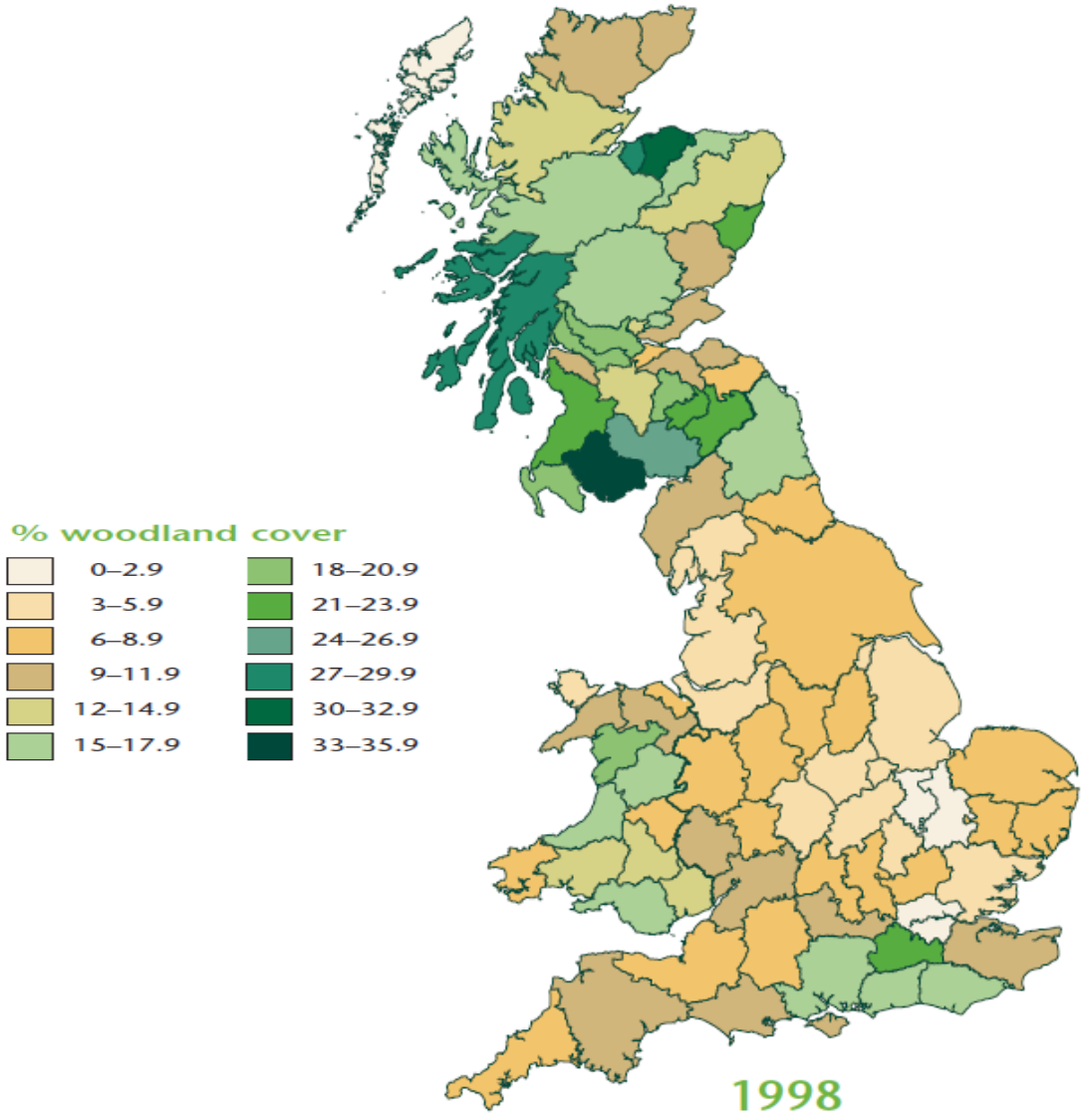


Figure 1- Map taken from the 2003 Forestry Commission National Inventory of Woodland and Trees showing vegetation density

3.0 Investment Drivers

Tree cutting is driven primarily by quality of supply considerations which can manifest themselves through a programme of inspections, customer requests, or faults, initiating the clearance of trees. There is a requirement to achieve statutory clearances, and any risks, such as presented by climbable trees, need to be removed and/or mitigated against.

3.1 Summary of Fault Trends

The figures 2, 3, and 4 show the fault trends at various voltages where trees have been the main cause. They do not include the exceptional events experienced since October 2013.

At 132kV – There are only a small numbers of faults due to trees at 132kV and this fluctuates from year to year at typically less than two.

EHV – The higher number of faults, particularly the peak in 2007, reflect periods of bad weather or storms. The numbers are relatively small, with recent figures fluctuating at less than three faults per annum.

HV – The profile reflects the storm of 2007 and other periods of bad weather. Recent figures reflect fluctuations at less than 100 per annum.

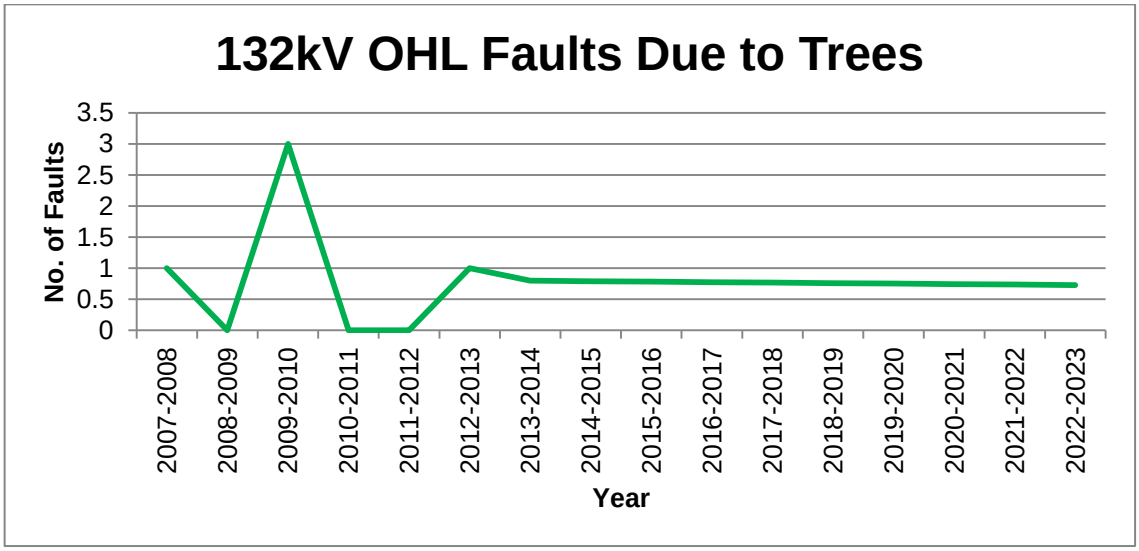


Figure 2 - Source: UKPN Faults Cube

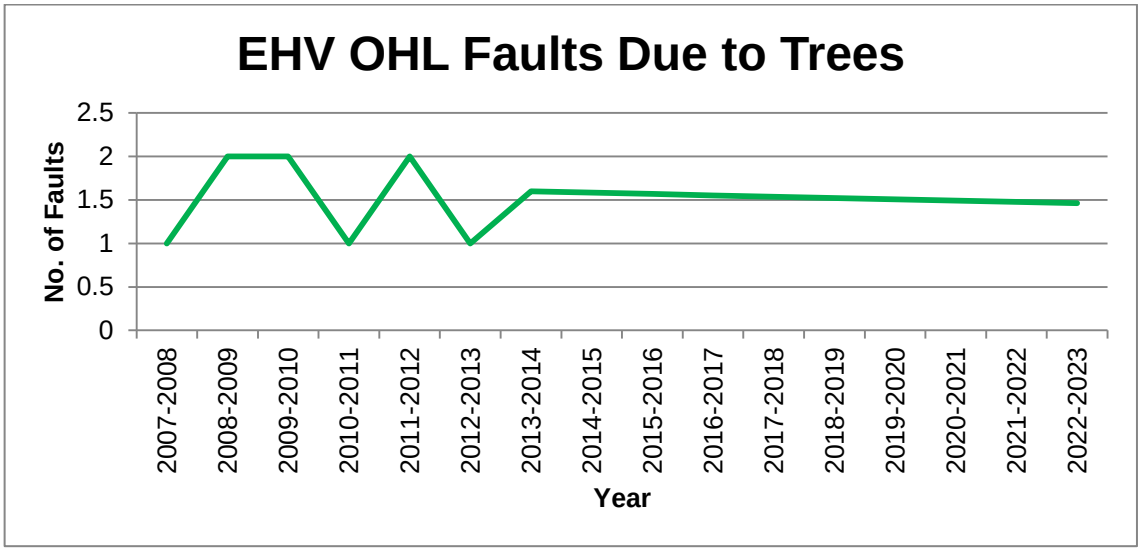


Figure 3 - Source: UKPN Faults Cube

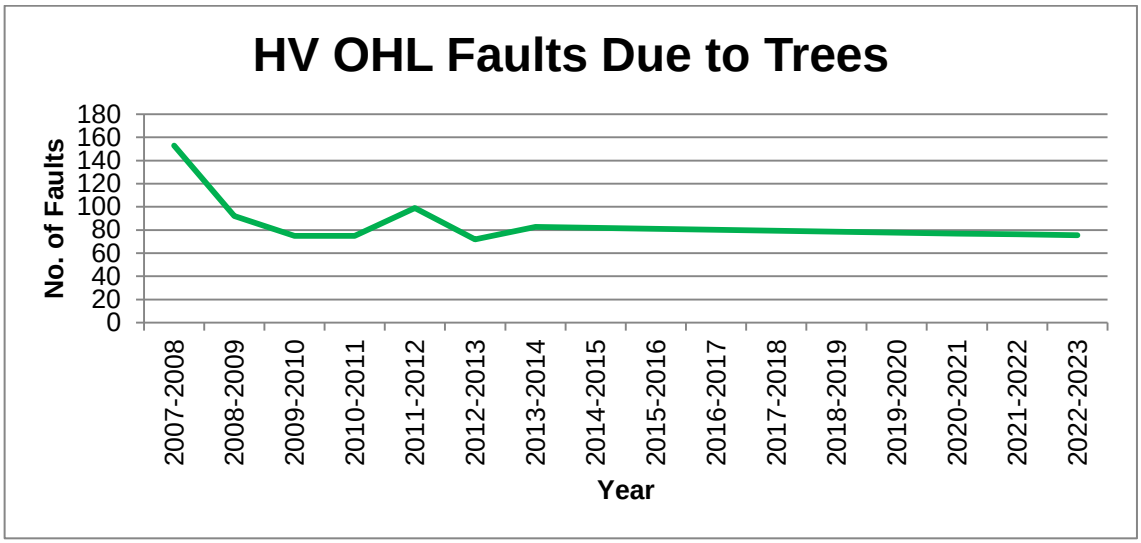


Figure 4 - Source: UKPN Fault Cube

4.0 Asset Assessment

Tree cutting and vegetation management relies on the checking and identification of circuits requiring clearance from trees. It is a specialist area with various limitations and issues preventing a standard approach being adopted throughout all regions.

SPN contains areas with some of the highest density of tree growth in England. This results in a large number of restricted or limited cuts or refusals from land-owners wanting to preserve the natural beauty of their trees to provide screening, and increasing the costs of vegetation management in the region.

4.1 Types of Contract

UK Power Networks has managed tree-cutting contracts covering networks from EHV down to LV. These were put in place in 2010 following an in depth assessment of the requirements and testing the market through formal tendering processes.

This arrangement means that once a network has been cut to specification, the contractor takes over the management of the network to ensure compliance to the required clearances and to minimise tree-related faults. Compliance has proved difficult to achieve in practice due to problems with access and land-owner permissions (see “Issues” section 4.2 below), hence there is a continued requirement for tree-cutting year on year.

From January 2013, following the failure of one of the contractors, a new arrangement has been introduced which adopts a risk-based approach to tree-cutting on the 132kV network. Priority is given to those areas with high infestation (vegetation) and proximity to overhead lines.

Auditing of the contract is undertaken by local tree cutting managers who liaise with the contractors to ensure compliance to contract and value for money. Periodic audits are undertaken by external companies to provide an independent overview of the contractors’ compliance.

4.2 Issues – Refusals and Limited Cut

One of the major issues affecting effective tree-cutting is gaining permission to cut to the required clearances. UK Power Networks sets a preference of clearance to ground level within the swathe required, which is often achievable at 132kV and 33kV. However, at the lower voltages, landowners often apply restrictions limiting the cut allowed. In some cases, there is a refusal to allow any cutting, or the permitted amount is so small that required clearances cannot be maintained without revisiting the landowner on a frequent (annual) basis.

HV lines in the view of domestic properties may have screening planted; cutting this often involves felling the existing trees and re-planting with other trees to gain permissions. This can be a costly exercise.

As landowners become more environmentally minded, it is likely that these issues will increase and lead to higher capex spend on undergrounding overhead lines where safety may be compromised as a result.

Our public safety team’s role is to assist in this by providing targeted information to landowners and land users in order to improve the understanding of overhead line safety such as clearances from trees, buildings etc.

4.3 Ash Dieback

Little is known about the effect of ash dieback and how it will impact on future tree-cutting requirements. Disposing of routine tree-cutting waste is likely to become more onerous, and the requirement for felling and disposing of trees likely to interfere with overhead lines will increase costs.

The Forestry Commission information shown below indicates that East Anglia and the South East of England are experiencing the heaviest concentration of cases of this disease as at January 2013. The impact of any actions to reduce spread and loss of diseased trees will therefore be felt here in the coming few years. We are waiting for developments in government action to understand and implement the requirements.

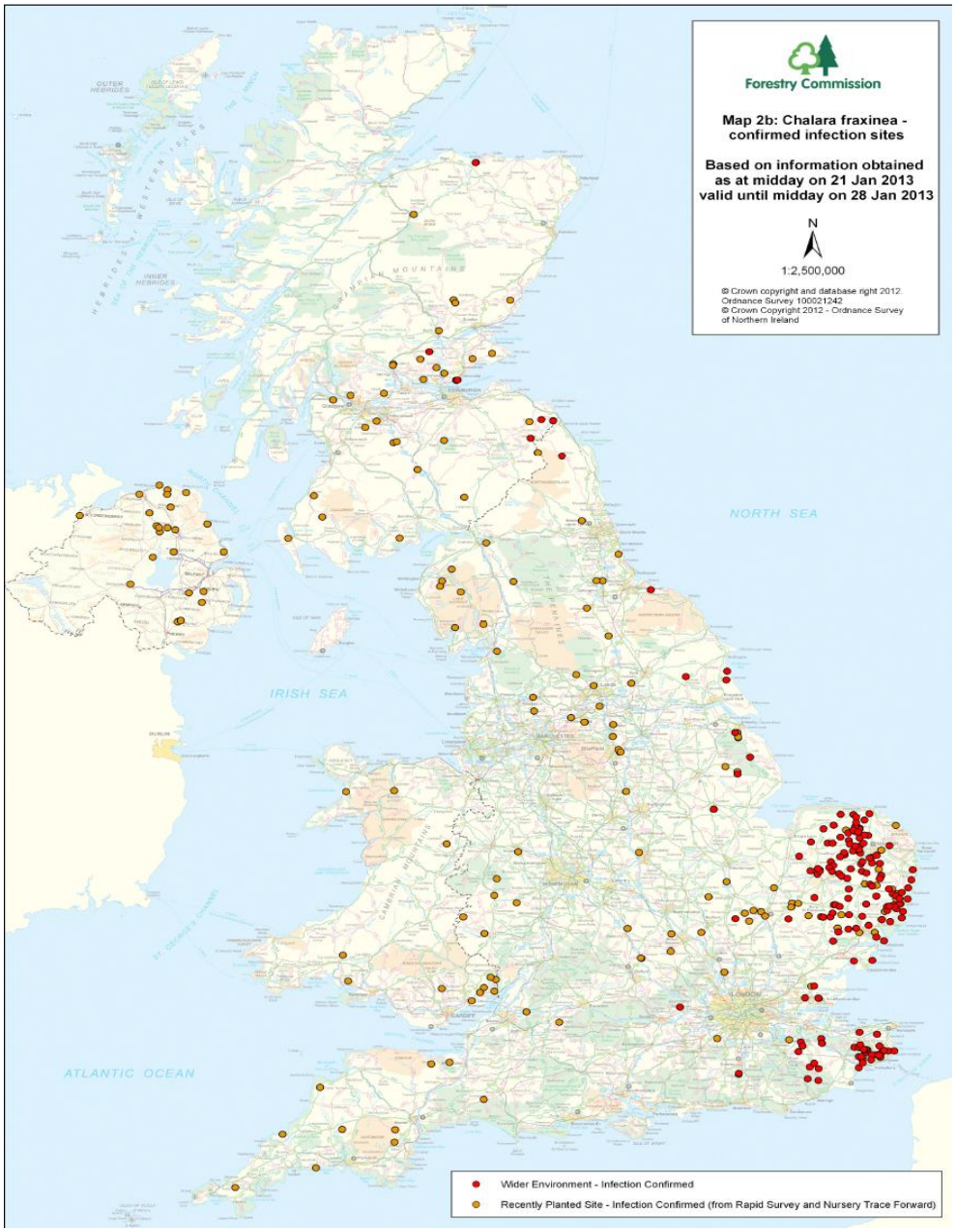


Figure 5 - Map from Forestry Commission showing Ash Dieback sites

4.4 ETR132

ETR 132 was formally started in January 2009, with a requirement to increase the resilience of 20% of the overhead line network to storms over a 25 year period. The circuits chosen for resilience are those with the most customers connected to provide the biggest impact from the programme. To date, ETR132 resilience cutting has been absorbed into the normal tree-cutting schedules by identifying feeders that have high numbers of customers and only short lengths of tree-cutting required.

A revised ongoing plan to identify further strategic circuits where there will be denser tree growth will be required to fulfil the overall requirements. This will lead to increasing volumes for tree-cutting as the density of growth increases. Other methodologies are being investigated that would preclude the need for cutting, but achieve compliance by assessing and managing the risk of trees. There is more on this in the innovation section.

Volumes have been calculated on an annual basis using the network length to be made resilient and the timescale for completion. The ramp up into ED1 represents the start up into the new process.

5.0 Intervention Policies

EOP 01-0009 outlines the policy for "Vegetation Management in the Vicinity of Overhead Lines and Structures". In addition, EDS 08-0103 – the policy for "Increasing the Storm Resilience of Overhead Lines on UKPN Networks**"** relates to tree-cutting in this context. These documents outline the minimum and required clearances, the methodology to apply them, and mitigation for various recorded site risk ratings.

The above intervention cycles (section 2.2) have been set using an iterative process utilising a risk based approach with the experience of network performance. The managed network approach, as outlined in section 4.1 builds on these guidelines and utilises the expertise of the tree cutting contractor to establish the most cost effective cutting regime taking into account clearances achieved in particular spans and growth rate of the vegetation. Consistent cutting over at least two cycles should allow a review of the cycle periods, but with issues of limited cuts and refusals, as outlined in section 4.0, this is still developing.

6.0 Innovation

Output from an IFI project has identified a methodology to progress a more detailed view of the required ETR132 actions. With the use of mapping imagery, trees requiring cutting along HV lines can be identified and then classified by customer numbers connected to each circuit. This can prioritise locations where most benefit will be gained. Tree-cutting alone is not the complete solution for gaining benefits from the resilience strategy, as there is often strong resistance to cutting to the national standards (ENATS 43-8) for tree cutting clearances. An alternative to this is risk-assessing trees and removing only those likely to cause a problem. Currently, there is no robust process for assessing the necessary condition of a tree, because a tree may be sound when tested or assessed by an arboriculturist, but under stressful weather conditions may be likely to snap or be uprooted – and it is these aspects that also need to be explored. Discussions with a contractor to look at this have started, but robust implementation of ETR132 will slow as a result. This is not seen as an issue in attaining compliance with ETR132 by January 2034.

A better use of inspection resources is currently being assessed at LV, in order to undertake inspections of both trees and some overhead lines at the same time. This would allow the overhead line route to be patrolled/surveyed whilst an assessment is made of the vegetation clearances required provided that skilling and resourcing issues can be resolved.

7.0 ED1 Expenditure Requirements for Tree Cutting

7.1 Method: Constructing the Plan

Tree cutting will continue to follow existing policies such as EOP 01-0009 and EDS 08-0103 including the requirements of ENATS 43-08 and ETR132.

EOP 01-0009 – Vegetation Management in the Vicinity of Overhead Lines.
EDS 08-0103 – Increasing the Storm Resilience of Overhead Lines on Networks owned by UKPN.
ENATS 43-08 – Overhead Line Clearances.
ETR132 – Improving Network Performance under Abnormal Weather Conditions by use of a Risk Based Approach to Vegetation Management near Electric Overhead Lines.

The whole network will be surveyed/inspected in cyclic periods which will be reviewed after two full cycles. The volumes for inspection (in spans) are based on the km length of overhead line, multiplied, at the various voltages, by the appropriate average spans per km rate.

Tree cutting will be carried out on those spans identified as requiring clearance from trees. The volumes are based on historic cutting data, the cutting cycle, and network lengths derived from the 2012/13 RIGs return. The unit costs of tree cutting include ancillary costs such as: planning and notification of shutdowns; planting (replacement trees); land agent fees; traffic permits; compensation; and similar incidental costs.

Resilience cutting, in line with ETR132 requirements will be gradually increased over the period, to achieve approximately 7% resilience by the end of ED1 and to take into account ETR132 clearance that is not being covered under routine cutting. It has also been extended to include EHV, rather than just HV. This is commensurate with a process of targeting compliance for 20% of the overhead network in accordance with the ETR132 guidelines/code by 31st January, 2034.

7.2 Tree Cutting Plan

The plan is tabulated below. Cutting volumes are based on a percentage of spans inspected, at each voltage level, which has been derived from experience and historic achievement. Not all spans affected by trees require cutting in every cycle.

Description of Activity	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023
LV Tree Cutting - Spans Cut	14,509	14,509	14,509	14,509	14,509	14,509	14,509	14,509	14,509	14,509
LV Tree Cutting - Spans Inspected	24,182	24,182	24,182	24,182	24,182	24,182	24,182	24,182	24,182	24,182
HV Tree Cutting - Spans Cut	9,075	8,692	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760
HV Tree Cutting - Spans Inspected	20,166	19,316	19,467	19,467	19,467	19,467	19,467	19,467	19,467	19,467
EHV Tree Cutting - Spans Cut	3,286	3,286	3,286	3,286	3,286	3,286	3,286	3,286	3,286	3,286
EHV Tree Cutting - Spans Inspected	10,953	10,953	10,953	10,953	10,953	10,953	10,953	10,953	10,953	10,953
132kV Tree Cutting - Spans Cut	2,226	2,226	2,226	2,226	2,226	2,226	2,226	2,226	2,226	2,226
132kV Tree Cutting - Spans Inspected	3,773	3,773	3,773	3,773	3,773	3,773	3,773	3,773	3,773	3,773
ETR132 Resilience HV Tree Management (km)	14.4	28.4	12	24	36	46	58	58	58	58
ETR132 Resilience EHV Tree Management (km)	0	0	2	3	4	6	12	12	12	12
Includes RIGs Lines: CV14 Line 6, 7, 8, 9, 10, 11, 12, 13, 15, 19										

Table 5 - DPCR5 & ED1 Forecast – Trees. Source: RIGs

ED2 Volumes	2023 /2024	2024 /2025	2025 /2026	2026 /2027	2027 /2028	2028 /2029	2029 /2030	2030 /2031
LV Tree Cutting - Spans Cut	**14,509**	**14,509**	**14,509**	**14,509**	**14,509**	**14,509**	**14,509**	**14,509**
LV Tree Cutting - Spans Inspected	**24,182**	**24,182**	**24,182**	**24,182**	**24,182**	**24,182**	**24,182**	**24,182**
HV Tree Cutting - Spans Cut	**8,760**	**8,760**	**8,760**	**8,760**	**8,760**	**8,760**	**8,760**	**8,760**
HV Tree Cutting - Spans Inspected	**19,467**	**19,467**	**19,467**	**19,467**	**19,467**	**19,467**	**19,467**	**19,467**
EHV Tree Cutting - Spans Cut	**3,286**	**3,286**	**3,286**	**3,286**	**3,286**	**3,286**	**3,286**	**3,286**
EHV Tree Cutting - Spans Inspected	**10,953**	**10,953**	**10,953**	**10,953**	**10,953**	**10,953**	**10,953**	**10,953**
132kV Tree Cutting - Spans Cut	**2,226**	**2,226**	**2,226**	**2,226**	**2,226**	**2,226**	**2,226**	**2,226**
132kV Tree Cutting - Spans Inspected	**3,773**	**3,773**	**3,773**	**3,773**	**3,773**	**3,773**	**3,773**	**3,773**
ETR132 Resilience Tree Management HV (km)	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**
ETR132 Resilience Tree Management EHV (km)	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**

Table 6 - ED2 Forecast – Trees. Source: RIGs

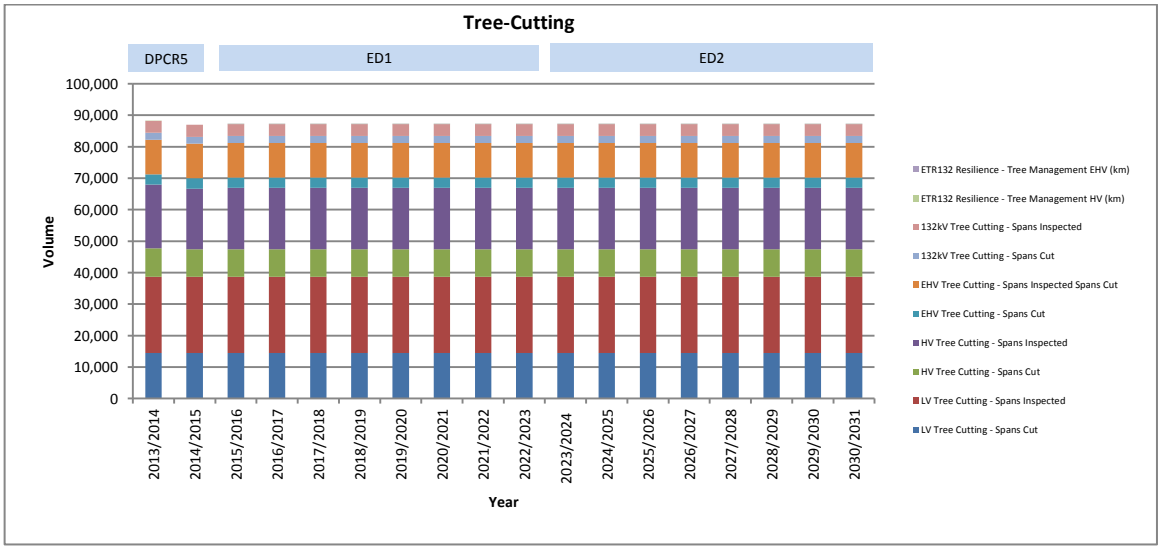


Table 7 - DPCR5, ED1 & ED2 Historical and Forecast Values

8.0 Deliverability

The proposed programme is based on existing contract rates and historic cut-to-inspect ratios. The current contractor-managed network approach will be phased out and a UKPN-managed targeted-cut regime introduced utilising a risk-based approach centring on the spans affected by vegetation. Contractor incentives will be reviewed to achieve a more focused approach to tree cutting, together with anticipated savings against current contract rates of around 5%.

The issues as described below and in section 4.2 will often result in more frequent revisits and increased numbers of reactive cuts (outside the cyclic regime). Where full consents for tree cutting are not received; alternative vegetation/screening needs to be provided; and/or compensation payments made to landowners, this will lead to higher unit costs. As landowners become more environmentally minded and better informed of the options, it is expected that this will also lead to higher capex spend on undergrounding or diverting lines where safety may be compromised.

The volumes of network stated for cutting and inspection at the various voltages (LV, HV, EHV and 132kV) are based on 2012/13 network lengths as structural changes on the network will be relatively small. Although there will be some changes over the period, it is not anticipated that it will markedly change the cutting and inspection programme, which will follow the cyclic policy applicable during DPCR5. It is recognised that there are further spans containing vegetation with the potential to affect the overhead network. These do not currently require cutting, but, following inspection, may fall into that category.

At 132kV, a newly introduced risk-based approach will continue – giving priority to those areas close to overhead lines which have high levels of infestation (vegetation) and large numbers of customers likely to be affected.

It is proposed to extend this approach to the 33kV network with the introduction of new tree cutting contracts and following a review of the benefits, risks and practicalities.

The HV networks will be managed on a targeted approach following inspection and other risk-based drivers.

At low voltage, there is a four-year cyclic tree-cutting policy. Whilst it is intended to continue with a cyclic regime, it is expected that due to the issues recognised above, there will be an increased number of reactive cuts.

Progress on ETR132 resilience cutting will be gradually stepped up and developed through identification of further strategic circuits and adoption of a revised plan for implementation during ED1.

Appendices

Appendix 1 Age Profiles – Not relevant: intentionally left blank

Appendix 2 HI Profiles – Not relevant: intentionally left blank

Appendix 3 Fault Data – Included in this document – N/A

Appendix 4 WLC Case Studies – risk, cost, performance, condition, profiles for various options – Not relevant: intentionally left blank

Appendix 5 NLRE Plan – Included in this document – N/A.

Appendix 6 Sensitivity Analysis – Not relevant: intentionally left blank

Appendix 7 Named Schemes – Not relevant: intentionally left blank

All of the cost numbers displayed in this document are before the application of on-going efficiencies and real price effects.

Appendix 8 – Output NAMP/ED1 RIGS Business Plan Data Table Reconciliation

Outputs	NAMP (Volume)											Asset Stewardship reports / RIGs Table (Volume)										
Investment description	NAMP Line	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total	Total #*	RIGs Table	RIGs Row	Investment description	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
LV Tree Cutting - Km Cut	2.43.04	683	683	683	683	683	683	683	683	5,464	116,074	CV14	6	LV Tree Cutting - Spans Cut	14,509	14,509	14,509	14,509	14,509	14,509	14,509	14,509	**116,072**
LV Tree Cutting - Km Inspected	2.43.04	1,138	1,138	1,138	1,138	1,138	1,138	1,138	1,138	9,104	193,456	CV14	7	LV Tree Cutting - Spans Inspected	24,182	24,182	24,182	24,182	24,182	24,182	24,182	24,182	**193,456**
HV Tree Cutting - Km Cut	2.43.03	834	834	834	834	834	834	834	834	6,674	70,081	CV14	8	HV Tree Cutting - Spans Cut	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	**70,080**
HV Tree Cutting - Km Inspected	2.43.03	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	14,832	155,736	CV14	9	HV Tree Cutting - Spans Inspected	19,467	19,467	19,467	19,467	19,467	19,467	19,467	19,467	**155,736**
EHV Tree Cutting - Km Cut	2.43.02	365	365	365	365	365	365	365	365	2,921	26,287	CV14	10	EHV Tree Cutting - Spans Cut	3,286	3,286	3,286	3,286	3,286	3,286	3,286	3,286	**26,288**
EHV Tree Cutting - Km Inspected	2.43.02	1,217	1,217	1,217	1,217	1,217	1,217	1,217	1,217	9,736	87,624	CV14	11	EHV Tree Cutting - Spans Inspected	10,953	10,953	10,953	10,953	10,953	10,953	10,953	10,953	**87,624**
132kV Tree Cutting - Km Cut	2.43.01	722	722	722	722	722	722	722	722	5,776	17,809	CV14	12	132kV Tree Cutting - Spans Cut	2,226	2,226	2,226	2,226	2,226	2,226	2,226	2,226	**17,808**
132kV Tree Cutting - Km Inspected	2.43.01	1,161	1,161	1,161	1,161	1,161	1,161	1,161	1,161	9,287	30,184	CV14	13	132kV Tree Cutting - Spans Inspected	3,773	3,773	3,773	3,773	3,773	3,773	3,773	3,773	**30,184**
ETR132 Resilience Tree Management - HV (km)	2.43.03	12	24	36	46	58	58	58	58	350	350	CV14	18	ETR132 Resilience Tree Management - HV (km)	12	24	36	46	58	58	58	58	**350**
ETR132 Resilience Tree Management - EHV (km)	2.43.02	2	3	4	6	12	12	12	12	63	63	CV14	22	ETR132 Resilience Tree Management - EHV (km)	2	3	4	6	12	12	12	12	**63**
Total (000)		**8.0**	**8.0**	**8.0**	**8.0**	**8.0**	**8.0**	**8.0**	**8.0**	**64.2**	**697.7**				**87.2**	**87.2**	**87.2**	**87.2**	**87.2**	**87.2**	**87.2**	**87.2**	**697.7**

Table 8 Output NAMP/ED1 RIGS Business Plan Data Table Reconciliation (source: 19th February 2014 NAMP SR Table O / 21st October RIGS Table)

All of the cost numbers displayed in this document are before the application of on-going efficiencies and real price effects.

Notes:

NAMP volumes are route lengths in **km.** RIGs table volumes are circuit lengths in **SPANS** for cutting and inspections.

ETR132 Resilience Tree Management volumes are in km in all instances.

[#] Cutting volumes are based on a percentage of spans inspected which has been derived from experience and historic achievement. Not all spans affected by trees require cutting in every cycle.

* Conversion from km to spans based on:

LV	21.25 spans/km
HV	10.5 spans/km
EHV	9 spans/km
132kV	3.25 spans/km

Appendix 9 – Efficiency Benchmarking

The following chart shows the comparative network lengths, illustrating that SPN has one of the smallest lengths of overhead line network.

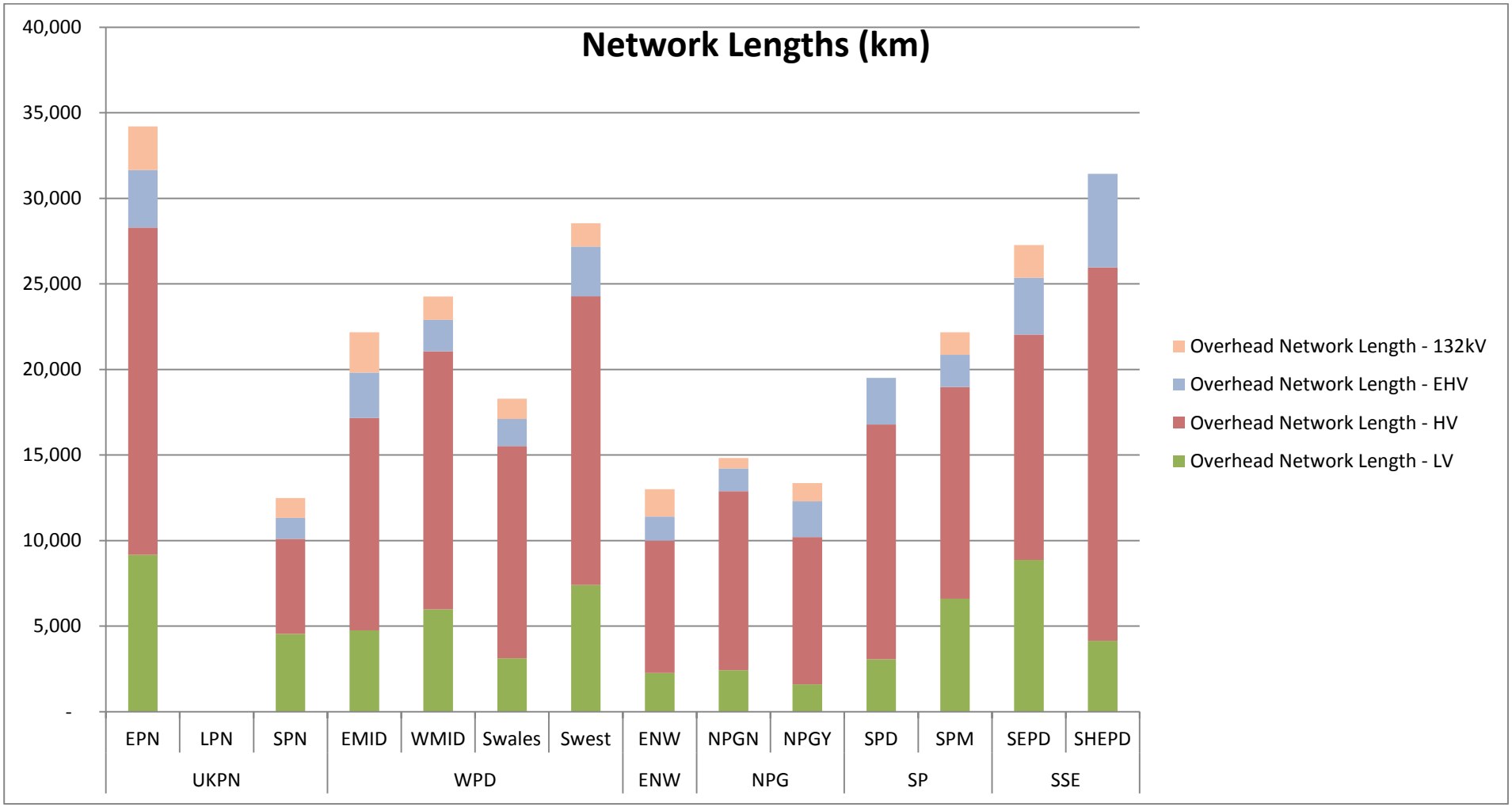
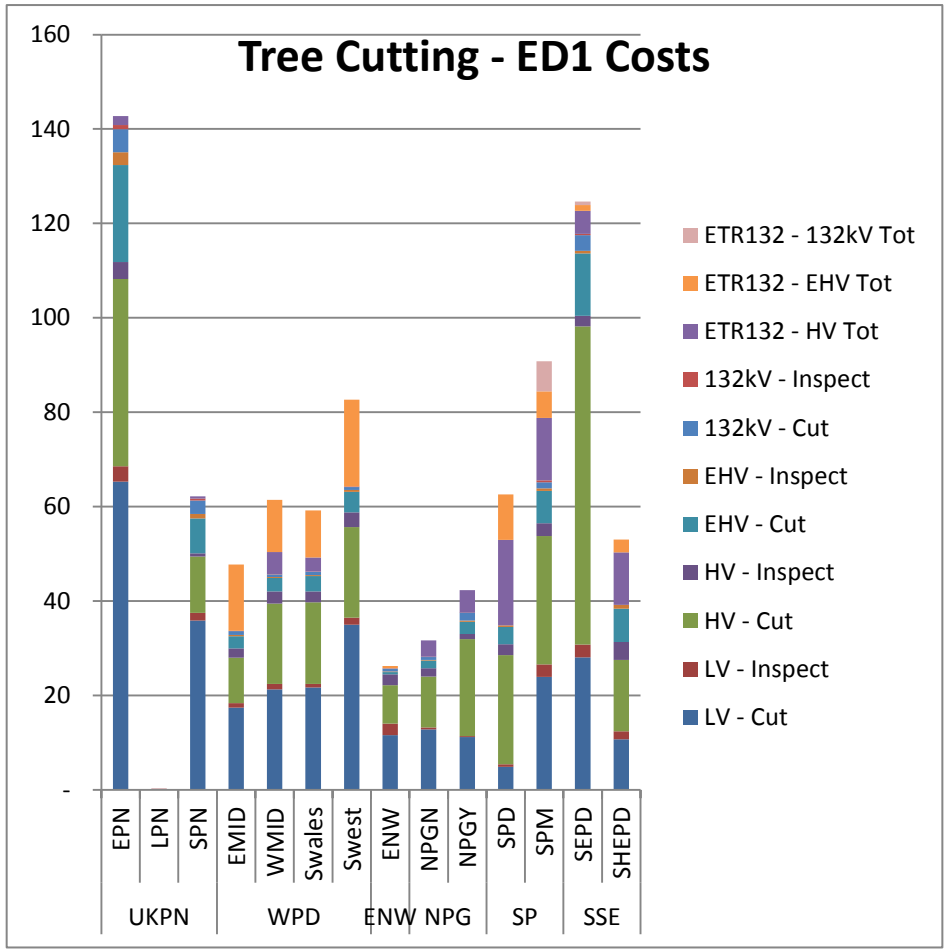


Figure 6 – Efficiency Benchmarking of Network Lengths (Source : DNO data share_2013)

Appendix 9 (Cont'd).

The charts below show the comparative proposed ED1 investment for all DNOs. The March 2014 costs reflect the increased costs proposed for SPN in the UKPN re-submission, incorporating additional ETR132 commitments.



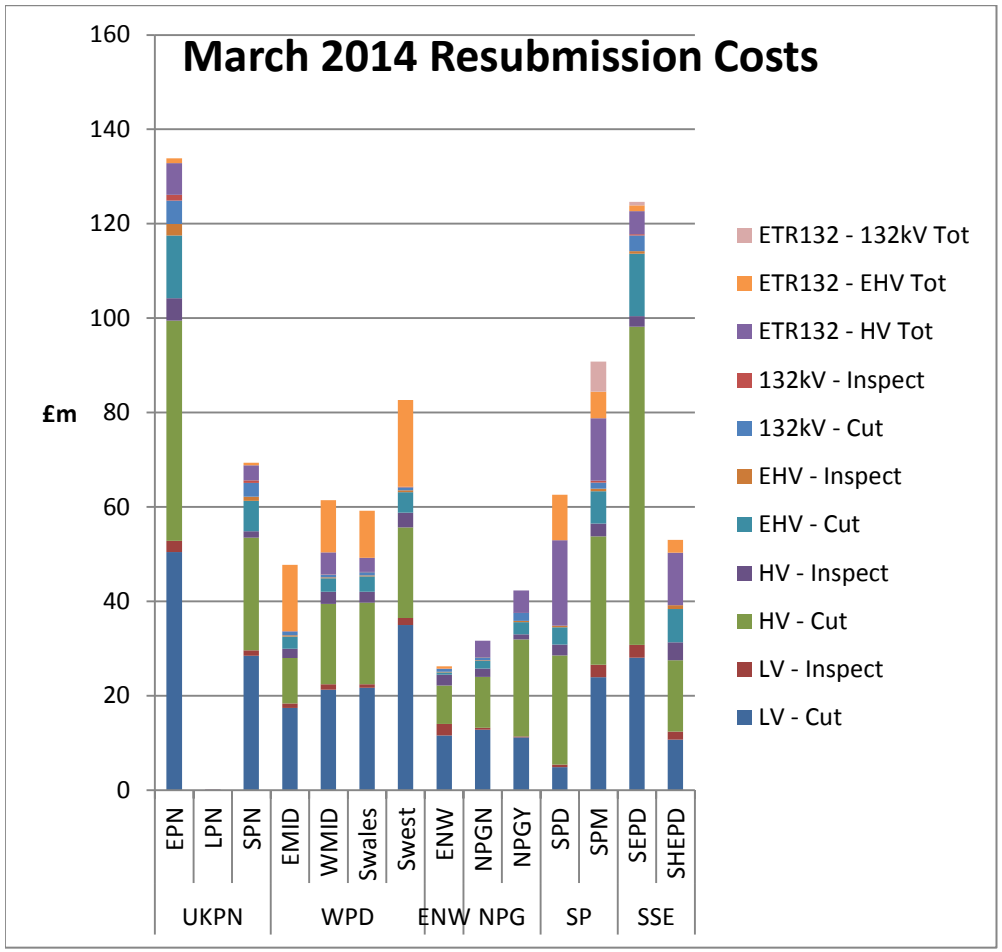


Figure 7 – Efficiency Benchmarking (source: DNO data share_2013)

Appendix 9 (Cont'd).

The bar chart below shows the cost divided by volume for cutting and inspection activities at each voltage (excluding ETR132). The average unit cost of all activities (excluding ETR132) for each DNO is shown by the "Avg All Voltages" line illustrating that SPN are comparable with most other DNOs equalling the DNO average.

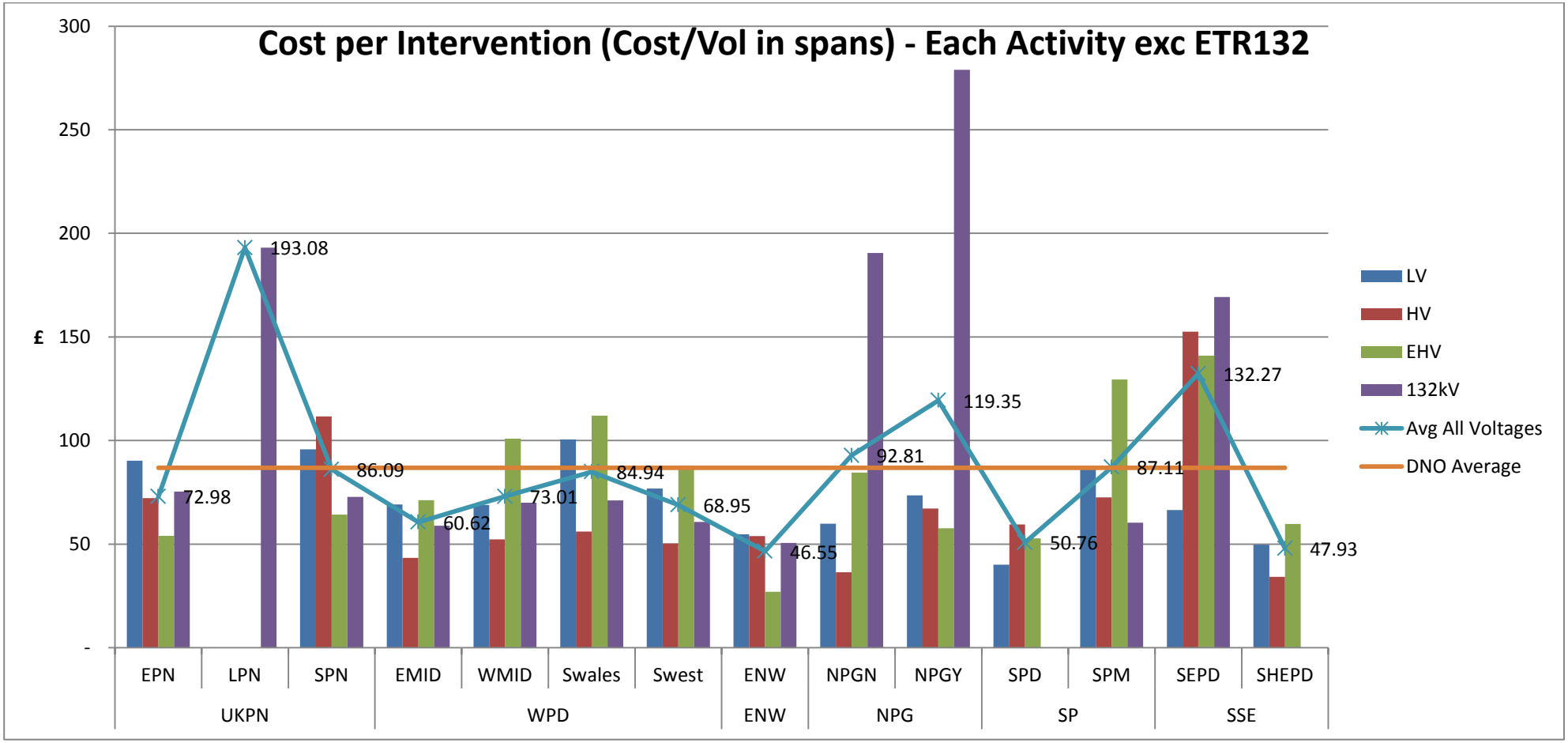


Figure 8 – Efficiency Benchmarking (Source :DNO data share_2013)

Appendix 9 (Cont'd).

The following graph shows the effective Unit Costs – based on total ED1 expenditure, divided by the total volume (in spans) of all activities (i.e. cutting, inspection and ETR132 – converted to spans) for all voltages. SPN demonstrates marginally above average unit costs across all activities due to the high density of trees and higher compensation costs – particularly relating to ETR132 and as a result of the recent storms.

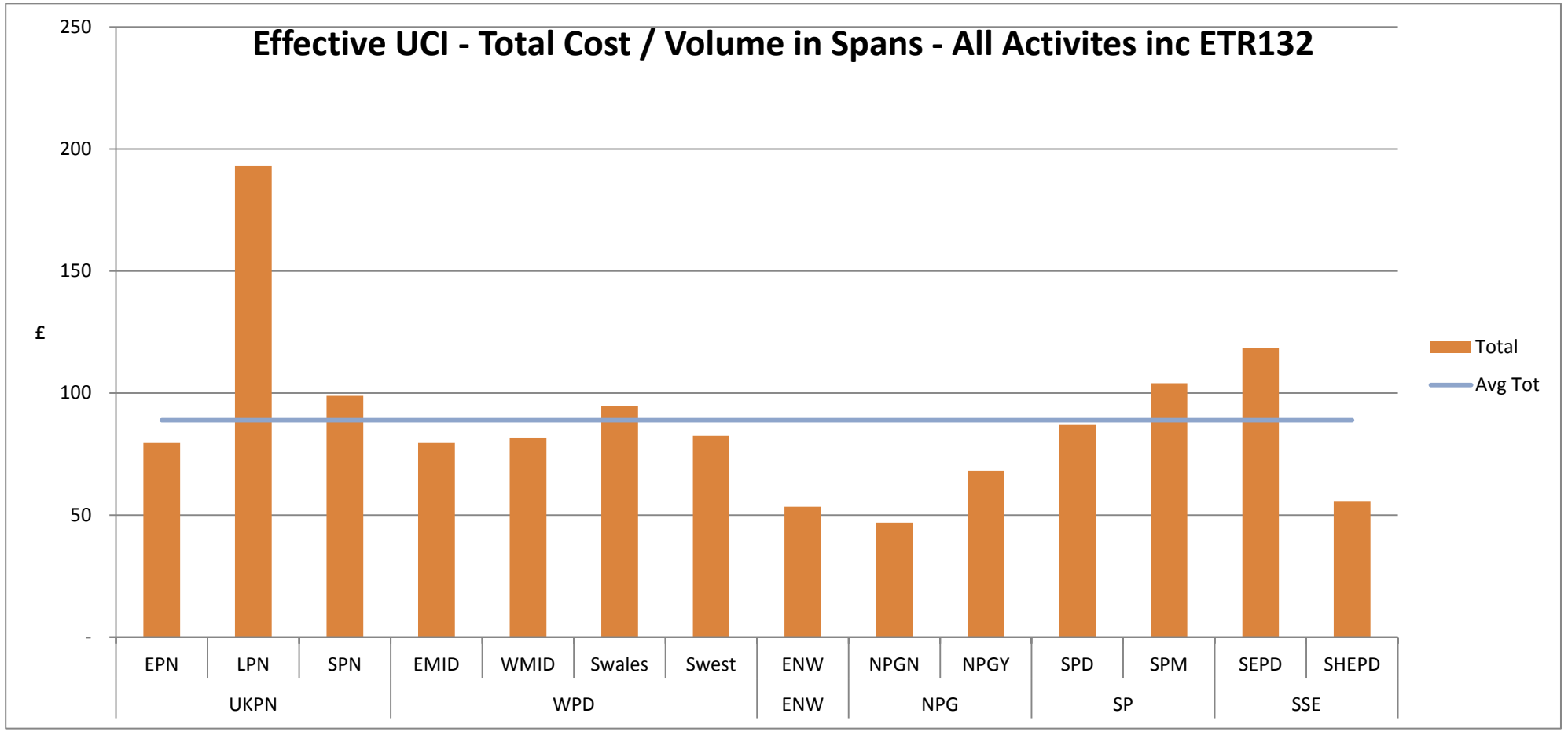


Figure 9 – Efficiency Benchmarking (Source : DNO data share_2013)

Appendix 10 – Material Changes Since July 2013 ED1 Submission

10.1 Summary of Changes

Changes between the July 2013 submission and the March 2014 re-submission are summarised and discussed below.

Asset type	Action	Change type	2013 Submission	2014 Submission	Difference (Reduction)	Comment
Trees	Cut and Inspect	Volume	No change	No change	N/A	No change in tree cutting and inspection volumes
		Investment (£m)	**£61.66**	**£65.65**	**£3.99**	UCI adjustments
		UCI (£k)	Various	Various	Various	Dependent on voltage
Trees	ETR132	Volume	456	413	(43)	Targeted Plan
		Investment (£m)	**£0.53**	**£3.72**	**£3.18**	Increase in UCI
		UCI (£k)	1.1744	9.000	7.826	As per DTI

Table 9: Material changes since July 2013 ED1 Submission

Sources: Final SPN Business Plan Data Tables following the Ofgem questions and answer process and the 21st February 2014 ED1 Business Plan Data Tables.

The net effect (compared to the July 2013 submission) is an increase of £7.17m (11.5%).

Tree Cutting & Inspections

The volumes of network stated for cutting and inspection at the various voltages (LV, HV, EHV and 132kV) are based on 2012/13 network lengths and have been held at those values for the ED1 submission as there will be relatively small structural changes to the network. Although there will be some changes over the period, it is not anticipated that it will markedly change the cutting and inspection programme, which will follow the cyclic policy applicable during DPCR5. It is recognised that there are further spans containing vegetation with the potential to affect the overhead network. These do not currently require cutting, but, following inspection, may fall into that category. The UCIs have been revised in line with current contractual rates, and an efficiency reduction of 5% applied going forward into ED1.

ETR132 Resilience Management

UKPN have reviewed their proposals and, following their experiences in recent storms, have increased the scope of ETR132 resilience tree management for the ED1 period to include EHV and to reflect additional expected costs resulting from compensation payments, re-planting and increased cutting costs. This review has resulted in alignment of unit costs to the rates detailed by the DTI in 2006[1], restated volumes (in km) and a revised programme to achieve compliance.

The ETR132 volumes have been reduced to target the length of network affected by trees and allow a longer ramp-up period into ED1. The revised volumes now include EHV as well as HV.

10.2 Detail

Following the experiences in the St Jude's Day and December 2013 storms, UKPN have increased the scope of ETR132 resilience tree management for the ED1 period to cover EHV as well as HV. Volumes for ETR132 Resilience Management have been re-stated (in km) in accordance with a revised plan to achieve 7% compliance against ETR132 by the end of ED1. The HV volumes have been reduced to target only the network affected by trees and allow a longer ramp-up into ED1. The unit costs have been aligned with those stated by the DTI in 2006[1]. This is to reflect additional expected costs resulting from compensation payments, re-planting and increased cutting costs.

The volumes of network stated for cutting and inspection at the various voltages (LV, HV, EHV and 132kV) have not been changed, and remain in line with the cyclic policy applicable during DPCR5. It is recognised that there are further spans containing vegetation, with the potential to affect the overhead network. These do not currently requiring cutting, but following inspection may fall into that category.

At 132kV, a new risk-based approach has been introduced giving priority to those areas close to overhead lines which have high levels of infestation (vegetation) and large numbers of customers likely to be affected. It is proposed to extend this approach to the 33kV network.

The HV network will be managed using a targeted approach driven by inspections and other risk-based factors.

At low voltage, there is a four-year cyclic tree-cutting policy. Whilst it is intended to continue with a cyclic regime, it is expected that due to issues such as limited cuts, and refused consents, there will be an increased number of reactive cuts.

Unit costs have been revisited and re-benchmarked against current/existing contract rates and allowance has been made for a reduction of 5% against these figures through re-negotiation of the contracts and a move from a contractor-managed network approach to a UKPN-managed target-cut approach focussing on the worst affected spans as a priority.

The revised proposals for the March 2014 re-submission are shown in Table 9.

DNO	Category	Totex submitted	Volume adjustment	Cost adjustment	ED1 Final Proposals
SPN	Trees	62.20	0.03	7.28	69.37
% adjustment				11.7%	

Table 10: Revised proposals for March 2014

[1] – Full Regulatory Impact Assessment, The Electricity Safety, Quality & Continuity (Amendment) Regulations 2006, by the Engineering Inspectorate, DTI, 7 June 2006 – Publication Reference URN 06/1295. Section 7.4.3.2 Total Cost to the Electricity Industry.