

SP Energy Networks 2015–2023 Business Plan

Updated March 2014

Annex

LV Plant Strategy

SP Energy Networks

March 2014



**SP ENERGY
NETWORKS**

LV Plant Strategy

March 2014

Issue Date	Issue No.	Document Owner	Amendment Details
17th March 2014	1.0	David Neilson	First Issue

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1. Scope

This Annex covers our strategy for the replacement and refurbishment of LV plant assets through the ED1 period.

2. Table of linkages

This strategy supports our ED1 Business Plan. For ease of navigation, the following table links this strategy to other relevant parts of our plan.

Document	Chapter / Section
SP Energy Networks Business Plan 2015-2023	Chapter C6 – Expenditure b. Asset Stewardship e. Non Load Related Investment
SP Energy Networks Business Plan 2015-2023 - Annexes	Annex C6 – Civil Strategy and Plans – SPEN
SP Energy Networks Business Plan 2015-2023 - Annexes	Annex C5 – Losses Strategy – SPEN
SP Energy Networks Business Plan 2015-2023 - Annexes	Annex C6 – Asset Health and Criticality Strategy – SPEN
SP Energy Networks Business Plan 2015-2023 - Annexes	Annex C6 – Cost Benefit Analysis – SPEN

3. Executive Summary

Our LV plant replacement and refurbishment programme is built up from asset condition information and age-based modelling.

Our LV infrastructure supplies electricity to domestic and commercial customers in our SPM and SPD license area. Low voltage plant comprises street pillars, underground link boxes, substation pillars and substation boards.

Our LV plant replacement programme will deliver:

Asset	SPM		SPD	
	Volume	£m	Volume	£m
LV Pillar Indoor	40	0.2	16	0.1
LV Pillar Outdoor	80	0.5	320	1.8
Wall Mounted LV Board	80	0.8	64	0.6
UG Link Boxes and Street Pillar	2352	12.4	2512	13.7
Total expenditure	-	13.9	-	16.2

Our LV plant refurbishment programme will deliver:

Asset	SPM		SPD	
	Volume	£m	Volume	£m
UG Link Boxes	2560	1.7	1136	0.4

Our LV plant replacement programme is important to delivering a number of our primary outputs, particularly public and employee safety and a reliable network performance for our customers. The programme also allows us to manage the overall asset health and associated risks.

4. Introduction

Our investment plans for LV plant during R10-ED 1 involves replacement or refurbishment of assets which are in a critical or poor condition. The investment plan has been developed using our Asset Risk Management policies and procedures.

Our use of asset condition and asset age-based modelling data, along with criticality, has ensured our plans reflect investment priorities.

5. Network Strategy

Our strategy for LV network asset replacement aims to:

- *Maintain safety, integrity and performance of the network over time so as to ensure long term sustainability and support network growth.*
- *To intervene prior to asset failure: When asset performance and reliability fall below acceptable operational limits and cannot be restored without an unacceptable financial risk and / or system risk exposure.*
- *Minimise failures, through interventions targeted on assets assessed to be approaching end of life: Utilising engineering condition or type information, as appropriate.*
- *Target investment based on an assessment of risk through probability of failure and criticality: Taking account of factors such as public and staff safety, strategic importance, customer sensitivity to supply disturbances, asset performance and environmental considerations.*

6. Assessment of Condition

- *The investment programme for our LV plant is based on condition assessment from site surveys, asset age modelling and recent intervention activity.*
- *Recent surveys leading up to DPCR5 indicated that this asset category is in worse condition than previously assessed. This led to an increased replacement volume during DPCR5 and we plan to continue at a similar asset replacement volume throughout ED1 and guided by our risk based assessment.*

7. Modelling Deterioration

We derive asset condition from age-based modelling using a rate of deterioration over asset life informed by routine asset inspections and our own engineering knowledge. This allows us to develop forward looking health indices with and without intervention from which we can develop asset specific intervention plans, supported by cost benefit analyses (detailed in **Annex C6 – Cost Benefit Analysis – SPEN**).

8. Health Index

Application of the asset age profile, condition surveys and deterioration factors have informed our replacement volumes. We continue to refine our approach to developing Health Indices for LV plant.

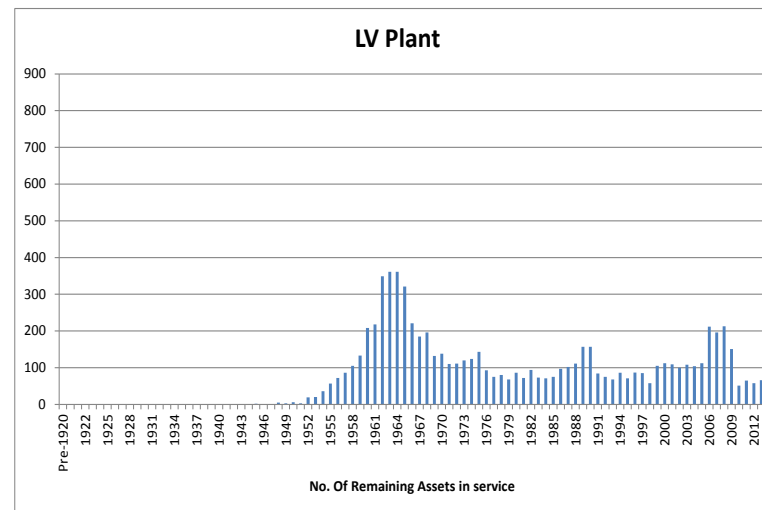
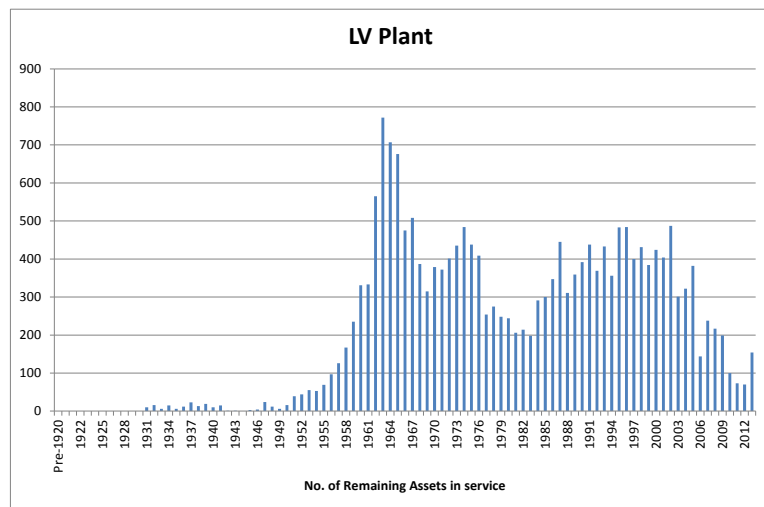
9. Criticality Index

Our criticality index comprises four factors:

- *Safety – based on asset exposure and proximity to the public and staff*
- *Environment – based on the asset's environmental exposure and the sensitivity of the geographical area local to the asset.*
- *System – based on the impact of asset failure on our distribution system's ability to deliver services to our stakeholders*
- *Financial – based on e.g. the cost to repair or replace*

The criticality in each element is assigned a level of Very High, High, Medium or Low. The overall asset criticality is based on the highest of the 4 assessments. The criticality, or site 'importance', of each substation is assessed first.

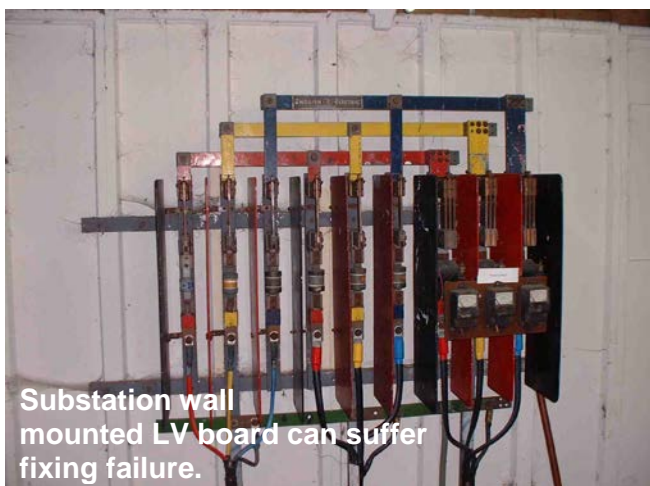
10. LV Asset Replacement plan



Long term age-based modelling is undertaken to identify asset replacement volumes and capital expenditure. The model also predicts long-term asset replacement volumes for each category to help us identify potential peaks in future workload. The age based modelling methodology is complemented by the bottom up condition assessment process, enabling short and long term risks to be appropriately managed.

Condition drivers:

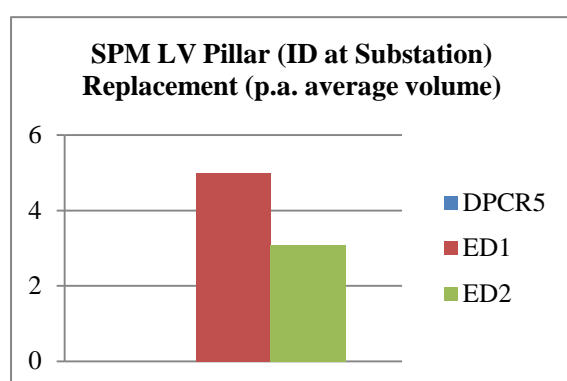
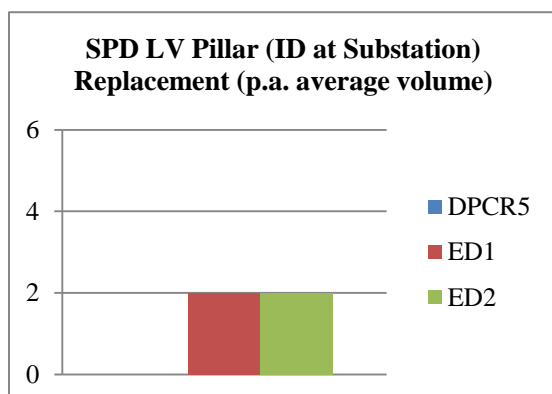
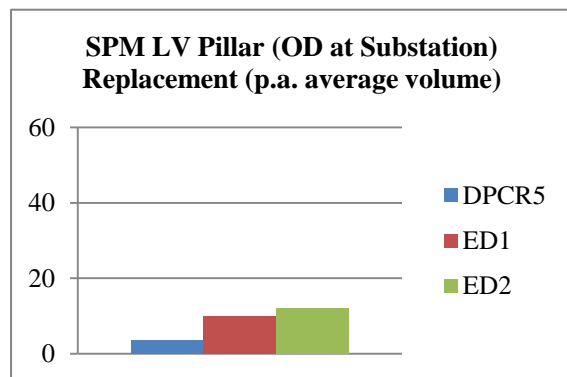
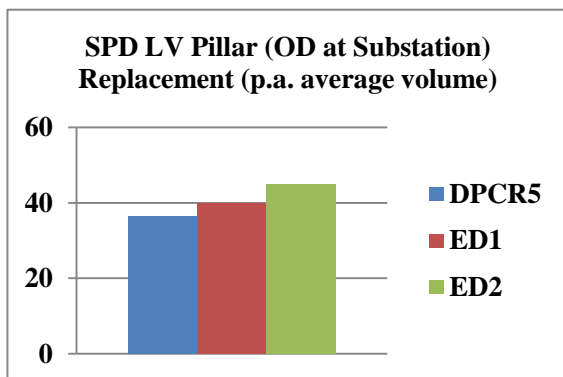
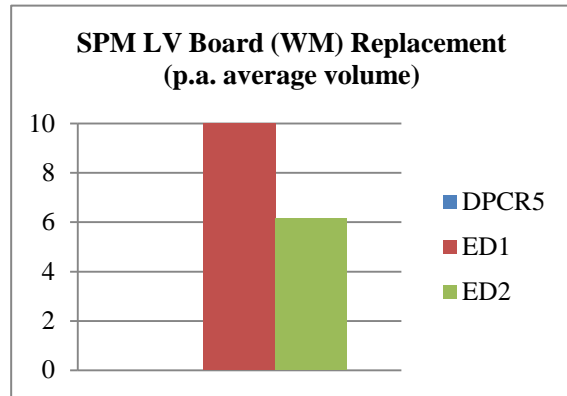
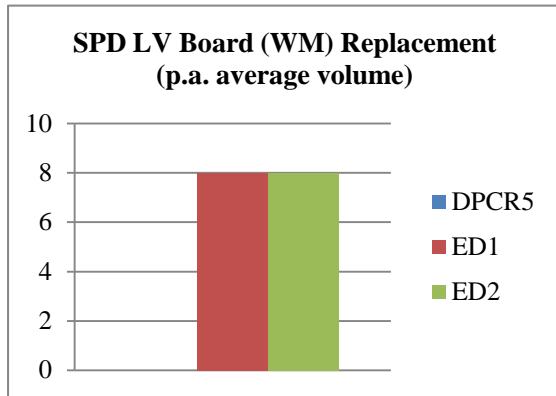
- *Corrosion of metal frames on above and below ground units*
- *Deterioration of wall or ground fixings*
- *Deterioration of fibre glass type enclosures*
- *Cracking on cast iron type pillar*
- *Contact misalignment and overall degradation*
- *Broken or faulty maximum demand indicators*
- *Phase barrier electrical and mechanical faults*
- *Water filled UGLB*
- *UGLB compound level issues*

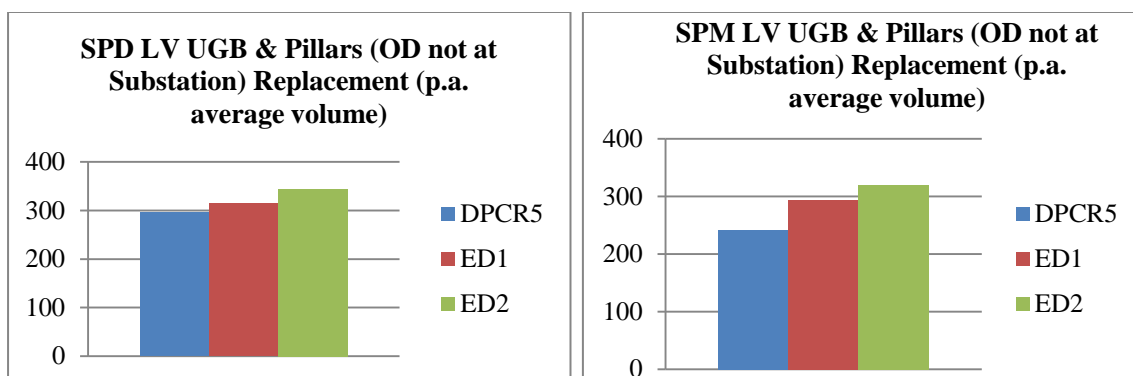


10.1. LV Plant Volumes

The optimised interventions look to exploit advances in new technology, where appropriate and avoid replacing assets on a like for like basis. We seek to utilise new retrofit technologies and refurbishment strategies where possible.

The proposed asset replacement, retrofit and refurbishment volumes for ED1 are shown in the graphs below. In total there are 1,588 interventions, representing 19.6% of the installed population.





Volumes proposed are aligned to current delivery achievement in DPCR5 and based on our condition and criticality analysis, the following numbers of units are forecast for intervention during ED1.

Asset	SPM		SPD	
	Volume	£m	Volume	£m
LV Pillar Indoor	40	0.2	16	0.1
LV Pillar Outdoor	80	0.5	320	1.8
Wall Mounted LV Board	80	0.8	64	0.6
UG Link Boxes and Street Pillar	2352	12.4	2512	13.7

Our LV plant refurbishment programme will deliver:

Asset	SPM		SPD	
	Volume	£m	Volume	£m
UG Link Boxes	2560	1.7	1136	0.4

10.2. LV Investment Expenditure

We have a total population of approximately 71,000 main LV distribution assets of which we plan to replace around 15% in RIIO ED1.

Our LV plant replacement plans for ED1 include:-

Asset Replacement Expenditure (CV3)	DPCR5		RIIO -ED1				% Difference Per Annum	
	Per Annum		Total		Per Annum			
	SPD	SPM	SPD	SPM	SPD	SPM	SPD	SPM
LV Pillar (ID)	0.40	0.00	0.09	0.23	0.01	0.03	-97%	512%
LV Pillar (OD at Substation)	0.31	0.03	1.84	0.46	0.23	0.06	-25%	80%
LV Board (WM)	-	-	0.64	0.80	0.08	0.10		

LV UGB & LV Pillars (OD not at Substation)	1.80	1.76	13.71	12.39	1.71	1.55	-5%	-12%
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Our refurbishment plans for ED 1 are shown:-

Asset Refurbishment Expenditure(CV6)	DPCR5		RIIO -ED1				% Difference Per Annum	
	Per Annum		Total		Per Annum			
	SPD	SPM	SPD	SPM	SPD	SPM	SPD	SPM
LV UGLB Covers	0.04	0.34	0.4	1.6	0.05	0.2	25%	-42%

11. LV Plant Options & Cost Benefit Analysis

Cost benefit analysis documentation is available for LV replacement options and is contained in **Annex C6 – Cost Benefit Analysis – SPEN** (CBA reference 62).