



2015-2023

RIIO-ED1 BUSINESS PLAN

Overview document

June 2013 (Updated April 2014)

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This version of the WPD RIIO-ED1 Business Plan (updated April 2014) contains a small number of revisions that provide additional explanation, update innovation and losses strategies, update financing values following Ofgem decisions and correct typographical errors. For avoidance of doubt these revisions do not change the original Business Plan expenditure proposals and output commitments.

Foreword

Our business is a simple one. Our purpose is to make sure the electricity network of poles, pylons, cables, wires and substations in our four distribution areas safely delivers power to homes and businesses around the clock.

Outstanding customer service combined with technical excellence, innovation and a clear business structure have made WPD the best electricity distribution business in the UK.

The WPD South West and WPD South Wales businesses have been industry leaders in the UK for many years. In April 2011 we purchased the former 'Central Networks' distribution businesses based in the West and East Midlands. These two businesses were known to be significantly less efficient than WPD with both poor levels of customer service and work delivery (the businesses are now known as WPD West Midlands and WPD East Midlands).

As part of the acquisition of the Midlands businesses we promised Ofgem (the regulator for electricity distribution companies) that we would significantly improve customer service whilst lowering costs. By applying our simple operational philosophy, where continuous change and innovation is part of what we do every day, to the Midlands businesses, we have been able to effect dramatic improvements in the region within 12 months of the acquisition:

- 20% reduction in operating costs;
- 40% reduction in the average amount of time a customer is without electricity;
- 96% reduction in the number of customers who have a power cut in excess of 18 hours;
- 70% reduction in the number of customer complaints to the industry ombudsman.

Put simply - we deliver on our promises. We are proud of our record but we are not complacent.

The next regulatory period will be eight years from April 2015 to March 2023 - a time in which many new challenges are predicted. These include safeguarding network security and providing reliability at an affordable cost, and continuing to push forward the boundaries of customer service excellence. In addition it is becoming increasingly important to deliver on a range of environmental commitments, including the facilitation of new 'low carbon technologies' – specifically heat pumps for domestic heating, solar photovoltaic for electricity generation and electric vehicle charging.

Our Business Plan sets out our view of this future and has been influenced by engagement with our stakeholders. It explains what we intend to deliver, the amount we propose to invest and how this will impact customers.

Our aim is to keep our business simple, to deliver on our promises and to continue to innovate. Our customers will receive the highest levels of customer service at an efficient cost and WPD will continue to be the industry leader in electricity distribution.



Robert Symons, CEO,
Western Power Distribution (WPD)

1 Introduction

- 1.1 This document provides an overview of Western Power Distribution (WPD) Business Plan for the eight year period from April 2015 to the end of March 2023. It includes what we intend to deliver, how much it will cost and the benefits provided to customers and stakeholders.
- 1.2 The eight year period aligns with the next Ofgem regulatory price control review period, known as RIIO-ED1; the first for electricity distribution to be determined using the Revenue = Incentives, Innovation and Outputs framework.
- 1.3 The current price control is called Distribution Price Control Review 5 (DPCR5) and it spans a five year period from April 2010 to March 2015.
- 1.4 This Business Plan overview document, supplementary annexes, Business Plan Data Templates, Price Control Financial Model, cost benefit analysis spreadsheets and supporting data, together form the submission under RIIO-ED1 to Ofgem, who will use the information to determine allowed revenues.

Structure of this document

- 1.5 We appreciate that the readers of this document will range from regulatory experts and well informed stakeholders through to new customers who may have had little previous knowledge of WPD. We have therefore set out to provide a simple overview of our plans and wherever possible have sought to avoid using acronyms or ‘industry jargon’. We include a glossary at the end of the document to help explain specific terms used.
- 1.6 More technical and detailed information is presented in supplementary annexes that are aimed at readers who have a specialist interest.
- 1.7 The document is subdivided into the following sections:

Chapter	Title	Content
2	Executive summary	An overview of the Business Plan, its aims and its conclusions
3	Who we are and what we do	A simple description of our business
4	Our track record	What we have achieved
5	Developing the plan for our business	The key business objectives and long term strategy that drive our business
6	Developing the plan for our stakeholders	An overview of our stakeholder engagement process and the preferences of stakeholders
7	Incentives	The incentives that we believe should be active in RIIO-ED1
8	Innovation	An overview of our Innovation Strategy
9	Outputs	The key services and results we are going to deliver
10	Expenditure	The amount we will be spending and on what
11	Uncertainty	Details of where there is uncertainty that could affect the overall programme planned for RIIO-ED1
12	Financing the plan	How we will finance the network investment through debt and equity
13	Impact on customers’ bills	An illustration of how the costs for customers will change as a consequence of the expenditure in the plan
14	Glossary	An explanation of specific terms and acronyms

Structure of this document

1.8 This Overview document is supported by nine supplementary annexes. These annexes expand upon the details contained within this document. They are available from the WPD website using the following hyperlinks:

SA-01 Stakeholder engagement

<http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Seperate-documents/Stakeholder-Engagement.aspx>

SA-02 Incentives

<http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Seperate-documents/Incentives.aspx>

SA-03 Innovation, smart grids, smart meters, losses and climate change adaptation

<http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Seperate-documents/Innovation.aspx>

SA-04 Outputs

<http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Seperate-documents/Outputs.aspx>

SA-05 Expenditure

<http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Seperate-documents/Expenditure.aspx>

SA-06 Uncertainty

<http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Seperate-documents/Uncertainty.aspx>

SA-07 Financing the plan

<http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Seperate-documents/Financing-the-Plan.aspx>

SA-08 Business performance, efficiency and benchmarking

<http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Seperate-documents/Business-Efficiency.aspx>

SA-09 Data assurance

<http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Seperate-documents/Data-Assurance.aspx>

2 Executive summary

Who we are and what we do

2.1 WPD is a Distribution Network Operator (DNO) and distributes electricity to 7.8 million customers across the Midlands, South Wales and the South West. Our role is simple:

- we operate our network assets effectively to 'keep the lights on' for our customers;
- we maintain our assets so that they are in a condition to remain reliable;
- we fix our assets if they get damaged or if they are faulty;
- we upgrade the existing networks or build new ones to provide additional electricity supplies or capacity to our customers.

2.2 Our costs make up around 16% of a domestic customer's bill.

Our track record

2.3 We keep the business simple and operate an efficient business model, with a flat structure that only has three layers between our field staff and the Board.

2.4 Our staff put customers first, treating customers the way they would like to be treated themselves.

2.5 Our track record is second to none:

- we deliver the best network performance, restoring customers' supplies after power cuts faster than any other network operator;
- we provide the best customer service in the UK, consistently appearing at the top of Ofgem's customer satisfaction surveys;
- we carry out the greatest number of innovation projects across the industry;
- we deliver our work programmes, adjusting them as circumstances change, but never losing sight of getting them completed;
- we operate a local, team based organisational structure that is predominantly made up of our own staff and delivers work in a low cost and efficient way.

2.6 In April 2011 we took over the West Midlands and East Midlands licences. Within a year, we had fully reorganised the businesses, reduced overhead costs, implemented WPD systems and operating procedures and most importantly improved customer service and network performance whilst at the same time significantly reducing costs.

2.7 In addition to achieving annual savings of £119m, since the 2011 acquisition, we will continue to seek out further efficiencies across the whole of WPD. We have allowed for an efficiency gain of 1% per annum of our controllable costs, which is reflected in reduced costs to customers.

Business environment

- 2.8** The greatest challenge facing our business is to adapt our networks and business processes to the demand for a low carbon environment. There is great uncertainty about the scale of low carbon technology (LCT) that will be adopted by customers to support the Government's objective of reducing greenhouse gases.
- 2.9** The Department for Energy and Climate Change (DECC) is forecasting high volumes of electric vehicles, solar panels and heat pumps, that could have a significant impact on how much additional capacity the network will require. Within the plan we have used our 'best view' of the scale of this LCT and its impact on the network as informed by independent analysis. We have also modelled alternative scenarios to provide us with a range of potential outcomes.
- 2.10** Our plans ensure that we can cater for the adoption of LCT irrespective of the amount or the mix of technologies that is adopted.

Our stakeholders' views are important

- 2.11** In the preparation of this Business Plan we have embarked on a comprehensive and extensive stakeholder engagement process. We have published consultation documents, carried out surveys and engaged directly with hundreds of stakeholders at workshops.
- 2.12** Due consideration has been taken of the wide range of views that were expressed throughout the engagement process.

Our programme of innovation

- 2.13** We will complete innovation projects that can be deployed on the network that will either further improve the service we deliver, reduce our costs or both.
- 2.14** We will share what we learn with others, irrespective of the results, so that the wider industry can benefit.

The outputs we will deliver in RIIO-ED1

2.15 We will continue to provide excellent levels of network performance and industry leading customer service whilst maintaining efficient costs. The main outputs that we will deliver are summarised below:

Category	Output
Safety	<ul style="list-style-type: none"> • Reduce the staff accident frequency rate by 10%. • Enhance security measures at higher risk electricity distribution sites. • Distribute 500,000 safety advice documents. • Educate 400,000 children about electrical safety through classroom discussions. • Ensure compliance with legislation with a target of zero improvement or enforcement notices being served by the Health and Safety Executive (HSE). • Work in partnership with the HSE.
Reliability	<ul style="list-style-type: none"> • Reduce the average number of times our customers lose their power supply by 16%. • Reduce the length of time our customers are without power by 23%. • Ensure that a minimum of 85% of customers are restored within an hour on HV faults. • Reduce by 20% the number of customers who suffer a power cut lasting more than 12 hours. • Reduce the number of customers who are classified as worst served by 20%. • Increase our resilience tree cutting programme by 40% to reduce storm related power loss. • Protect 75 electricity substation sites from the risks of flood damage.
Environment	<ul style="list-style-type: none"> • Facilitate the connection of increased volumes of LCTs. • Reduce the carbon footprint of the business by 5%. • Reduce leaks from electricity equipment - 75% less oil leaks and 17% less SF₆ gas leaks. • Improve visual amenity in National Parks and Areas of Outstanding Natural Beauty (AONBs) by replacing 55 km of overhead lines with underground cable.
Connections	<ul style="list-style-type: none"> • Reduce the overall 'average time to connect' by 20%. • Provide improved communication with customers including internet based quotations and job tracking facilities. • Deliver zero failures against the connections 'Guaranteed Standards of Performance'. • Facilitate a competitive market.
Customer Satisfaction	<ul style="list-style-type: none"> • Continue to be the best DNO group in the Ofgem Broad Measure of Customer Satisfaction. • Maintain stakeholder engagement to refine business objectives and demonstrate progress against outputs throughout RIIO-ED1 and beyond. • Enhance communication with customers by use of call backs, text messages or other social media formats to suit the needs of our customers. • Have the fastest answering response time to inbound customer telephone calls in the industry. • Have the fastest customer complaints resolution service in the industry.
Social Obligations	<ul style="list-style-type: none"> • Ensure we have accurate data on the Priority Services Register by contacting our vulnerable customers every two years. • Enhance services provided to vulnerable customers who lose their power supply. • Maintain our work with charities and support organisations to understand and react to current social issues with respect to power supply. • Help to address fuel poverty by making it easier for customers to access key information.

Safety

- 2.16** Safety is at the heart of everything we do. We will continue to target improvements in our safety performance. Whilst our safety performance is already very good, we will reduce the accident frequency rate involving our own staff by 10%.
- 2.17** Substations that are being targeted by vandals or thieves can present serious risks to members of the public, contractors or our own staff. The removal or destruction of electrical equipment by copper thieves also leads to the loss of power to our customers. Sites that are identified as high risk will have enhanced security measures implemented to reduce this risk.
- 2.18** We will continue our practice of targeted mailshots of our safety literature and will send out over 500,000 copies to specific landowners, businesses or leisure operators whose clients could be exposed to higher risks should those activities be conducted near to our equipment.
- 2.19** School children are not always aware of the potential danger of electricity or the potential danger of the electricity network. During RIIO-ED1 we will educate 400,000 school children about the potential dangers of electricity via our on-going programme of school visits.
- 2.20** We will work cooperatively with the Health and Safety Executive to not only ensure our practices and policies continue to be compliant with health and safety legislation but also to seek out and apply best practice in the management of safety.

Reliability

- 2.21** We will replace poor condition assets and provide additional network capacity where necessary to prevent power cuts and the length of time customers are without power.
- 2.22** Where power cuts occur we will respond quickly, restoring supplies as a priority. We will ensure that a minimum of 85% of our customers are restored within one hour when affected by a high voltage fault.
- 2.23** We currently have excellent performance against the requirement to restore power within 18 hours. We will reduce this target to a maximum of 12 hours. We will further improve the performance against the new 12 hour target by 20% over RIIO-ED1.
- 2.24** We will reduce the number of customers who are classified by Ofgem as “Worst Served” by 20% (4,000 customers). This will ensure 99.9% of our customers are not worst served.
- 2.25** Severe weather can lead to loss of power due to our overhead network being hit by windborne debris or trees. To increase the network resilience we have a programme to clear trees that are in the immediate vicinity of the network. We will increase the volume of resilience tree works by 40%.
- 2.26** Substations that become flooded can lead to the loss of power to many of our customers for extended periods. We will continue our programme of flood defence works at sites that are identified as prone to flooding to reduce this risk by protecting an additional 75 substation sites.

Environment

- 2.27** We will monitor the uptake of LCTs to identify 'LCT hotspots' and facilitate their connection, reinforcing the network where necessary.
- 2.28** We will take the results of our Low Carbon Network Fund (LCNF) projects and apply the learning within our business planning and design tools to add load without the need for reinforcement.
- 2.29** We will continue to reduce the impact of our activities on the environment by reducing our own carbon footprint by 5% through actions to reduce:
- our energy consumption by 5%;
 - the amount of oil that leaks from underground cables by 75%;
 - the volume of SF6 gas lost by 17%;
 - the volume of waste sent to landfill by 20% over the first two years and 5% per annum thereafter.
- 2.30** We will improve visual amenity in National Parks or Areas of Outstanding Natural Beauty (AONBs) by replacing 55km of overhead lines with underground cable.

Connections

- 2.31** We already provide an excellent connections service. However, we propose to further reduce the overall time to connect by 20% by reducing both the time to provide a quotation and the time to complete the physical works.
- 2.32** We will continue to work with relevant customers and stakeholders to improve our communication with them including the provision of online based quotations and tracking of their jobs.
- 2.33** The Guaranteed Standards of Performance (GSOPs) set out the minimum service standards that DNOs must meet under the regulatory framework. Where a standard is not met then a payment is made to that customer. WPD will continue to have the lowest number of failure payments made to customers under these connections GSOPs.
- 2.34** Over recent years we have been working with third party connection providers to facilitate competition within the connections market. We will continue to work with them, improving processes and data availability, so that the scope for competition is expanded to provide greater choice for customers.

Customer satisfaction

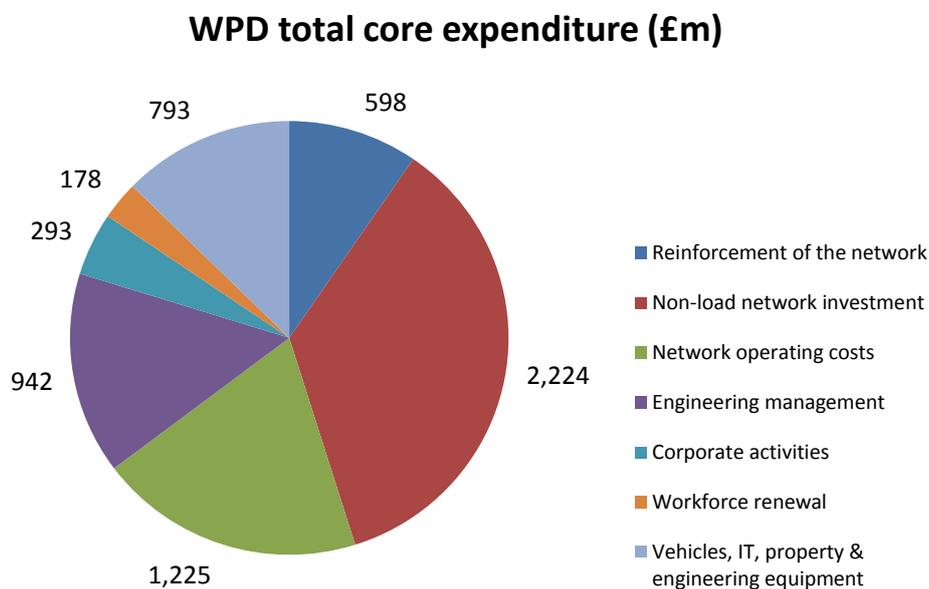
- 2.35** We will continue to be the best DNO for customer satisfaction as measured by Ofgem's Broad Measure of Customer Satisfaction.
- 2.36** We will maintain our stakeholder engagement process to understand and refine our service delivery to ensure our customers continue to get the service that they want now and to inform our future plans.
- 2.37** We will keep customers updated during power outages by the use of call backs or text messages or other social media methods in accordance with customers' preferences.
- 2.38** We will have the fastest response times for answering telephone calls in the industry.
- 2.39** We will have the fastest complaints resolution service in the industry.
- 2.40** We will continue to make improvements for the majority of customers that prefer to use the telephone, but we will also develop a range of communication methods during the current price control to include online information exchange and the use of social media. We propose to continue to introduce new methods of communication as technology evolves during RIIO-ED1.

Social obligations

- 2.41** We will ensure that we know who and where our vulnerable customers are so that we can give them extra help during power cuts. As a minimum we will contact every customer on the Priority Services Register every two years to validate the information we hold.
- 2.42** We will play a role in addressing fuel poverty by training staff to recognise the indicators of fuel poverty, enhancing the provision of relevant information and building a network of regional referral partners.
- 2.43** Where customers would benefit from information and periodic support we will work with partner organisations that have the relevant experience and expertise to help.

Expenditure

2.44 Over the RIIO-ED1 period we will be investing £6.25bn in core distribution business activities, funded through Distribution Use of System Charges (DUoS).



2.45 Of this total:

- £598m will be spent on reinforcing the network to accommodate load growth and the impact of low carbon technology on the network;
- £2,224m will be for maintaining the existing network through replacement and refurbishment of assets and improving the resilience and performance of the network;
- £1,225m will be for maintenance of assets, repairing faults and other associated activities;
- £942m will be used for engineering management including the costs of contact centres, stores and the people managing the delivery of the work programme;
- £293m will be for corporate activities such as human resources, finance and regulation;
- £178m will be for renewing and training of our workforce;
- £793m will be for the renewal and maintenance of vehicles, IT systems, non-operational property and tools and equipment.

2.46 In addition to the core expenditure of £6.25bn, a further £2.93bn is required to cover the costs of non-core activities such as smart metering, transmission charges, pensions and business rates. This makes the total expenditure funded through DUoS to be £9.18bn.

2.47 The table below re-states the values into the Ofgem cost classifications of totex, non-controllable opex and deficit pension contributions. The values tie up to the amounts in the Price Control Financial Model issued by Ofgem alongside the Decision to Fast Track WPD document (28th February 2014).

WPD Business Plan – Ofgem costs classifications (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
Core expenditure	1,877.70	1,880.20	990.7	1,503.80	6,252.40
Smart metering	8.7	9.3	4.1	5.7	27.8
Real price effects	142	140.8	71.4	112	466.2
Normal pension contributions	84.7	84.5	62.3	98.8	330.3
Miscellaneous	-2.2	-0.4	-2.3	-0.3	-5.2
Totex	2,110.90	2,114.40	1,126.20	1,720.00	7,071.50
Rates	276	362.7	144.8	146.4	929.9
Licence Fees	9.6	10.4	4	6.4	30.4
Transmission exit charges	107.9	92.7	68.7	71.6	340.9
Smart Metering - pass through	7.4	7.6	3.6	5.7	24.3
Carbon reduction commitments	0.8	0.8	0.8	0.8	3.2
Miscellaneous	0.4	0.3	0	-0.2	0.5
Non controllable opex	402.1	474.5	221.9	230.7	1,329.20
Deficit pension contributions	165.7	163.3	172.9	281.3	783.1
Total expenditure	2,678.7	2,752.2	1,521.0	2,232.0	9,183.8

Note that the expenditure represents WPD's best view which includes expenditure for worst served customers and undergrounding in AONBs and National Parks. These two costs categories are not included in the opening 'base' Price Control Financial Model (PCFM) because they are costs that are logged up and funded retrospectively. There is therefore a small difference between WPD's best case and the PCFM base case.

Uncertainties

- 2.48 The Business Plan covers the period April 2015 to the end of March 2023. In drafting the plan there are a number of uncertainties that could present a financial risk to the business. The principle uncertainties are detailed in the uncertainty section of this document.
- 2.49 Although we are best placed to manage the risk of delivery of our plan, there are some areas of uncertainty which need additional mechanisms due to the external nature of the uncertainty and its potential impact.
- 2.50 During DPCR5 Ofgem introduced a reopener mechanism that limited financial risk providing a safety net for companies where actual costs are materially higher than forecast. We propose that Ofgem continue to use reopener mechanisms. The full details of the uncertainties are discussed in Supplementary Annex (SA-06) Uncertainty.

Financing the plan

2.51 The expenditure proposals will require WPD to raise around £1.74bn of new debt and shareholders will re-invest £1,082m. In addition £850m of long term debt matures and will need to be re-financed. To calculate our allowed revenues and cash flows we have assumed:

Parameter	Value	Details
Cost of Debt	2.6%	Per Ofgem Decision to fast-track Western Power Distribution document 28 th February 2014.
Cost of Equity	6.4%	Per Ofgem Decision to fast-track Western Power Distribution document 28 th February 2014.
Gearing	65%	The same as DPCR5.
Vanilla WACC	3.9%	Derived from cost of debt and cost of equity.
Capitalisation	80%	The same as DPCR5 after taking into account changes in definition.
RAV Depreciation	35 years	For RIIO-ED1 we will transition from the DPCR5 20 year life to a 45 year life using the transition methodology included in NGET's final proposals.

Impact on customers' bills

2.52 Over RIIO-ED1 our charges will reduce by an average of 13.2% (before inflation).

2.53 For our four DNOs the detailed impact on both domestic and business customers' bills is shown below:

How this will impact domestic customer bills									
<i>In 2012/13 prices</i>									
WPD West Midlands									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-10.2%	0.9%	-5.4%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£10.29	£0.81	-£4.97	£0.88	£0.87	£0.88	£0.89	£0.89
Total distribution charge	£101.17	£90.88	£91.69	£86.72	£87.60	£88.47	£89.35	£90.24	£91.13
WPD East Midlands									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-8.2%	0.9%	-4.1%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£7.26	£0.74	-£3.34	£0.78	£0.78	£0.80	£0.81	£0.81
Total distribution charge	£88.11	£80.85	£81.59	£78.25	£79.03	£79.81	£80.61	£81.42	£82.23
WPD South Wales									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-22.7%	0.9%	-1.2%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£28.73	£0.89	-£1.19	£1.01	£0.97	£0.99	£0.98	£1.02
Total distribution charge	£126.28	£97.55	£98.44	£97.25	£98.26	£99.23	£100.22	£101.20	£102.22
WPD South West									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-17.0%	0.9%	-0.5%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£23.35	£1.06	-£0.58	£1.17	£1.15	£1.16	£1.17	£1.18
Total distribution charge	£137.52	£114.17	£115.23	£114.65	£115.82	£116.97	£118.13	£119.30	£120.48
WPD Total (weighted average)									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-13.4%	0.9%	-3.3%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£14.69	£0.87	-£3.14	£0.94	£0.94	£0.94	£0.95	£0.96
Total distribution charge	£109.85	£95.16	£96.03	£92.89	£93.83	£94.77	£95.71	£96.66	£97.62
Notes									
1 Revenues are profiled on a "Po/x basis"; revenues fall in 2015/16 and thereafter increase by 1.0% in real terms other than for DPCR5 IIS									
2 DPCR4 losses excluded because of uncertainty									
3 Smart metering included									
4 K factor included in 2014/15									
5 DPCR5 tax trigger impact included in 2014/15 and thereafter zero									
6 DPCR5 IIS included in 2014/15, 2015/16 and 2016/17 and thereafter zero									
7 IFI and LCNF included for DPCR5; NIA and NIC excluded for RIIO-ED1									
8 Domestic bill represents Profile 1									

How this will impact business customer bills

In 2012/13 prices

WPD West Midlands	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-10.2%	0.9%	-5.4%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£24.79	£1.95	-£11.97	£2.11	£2.11	£2.10	£2.14	£2.16
Total distribution charge	£243.71	£218.91	£220.86	£208.89	£211.01	£213.12	£215.22	£217.36	£219.52

WPD East Midlands	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-8.2%	0.9%	-4.1%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£18.30	£1.87	-£8.44	£1.97	£1.98	£2.00	£2.03	£2.04
Total distribution charge	£222.01	£203.71	£205.58	£197.14	£199.11	£201.09	£203.10	£205.13	£207.17

WPD South Wales	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-22.7%	0.9%	-1.2%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£85.85	£2.66	-£3.58	£3.04	£2.91	£2.94	£2.94	£3.04
Total distribution charge	£377.44	£291.59	£294.25	£290.67	£293.70	£296.61	£299.55	£302.49	£305.54

WPD South West	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-17.0%	0.9%	-0.5%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£51.77	£2.34	-£1.29	£2.60	£2.54	£2.57	£2.60	£2.63
Total distribution charge	£304.88	£253.11	£255.45	£254.16	£256.76	£259.31	£261.88	£264.48	£267.10

WPD Total (weighted average)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-13.4%	0.9%	-3.3%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£36.94	£2.18	-£7.91	£2.37	£2.35	£2.36	£2.39	£2.42
Total distribution charge	£276.37	£239.44	£241.62	£233.71	£236.09	£238.43	£240.80	£243.19	£245.61

Notes

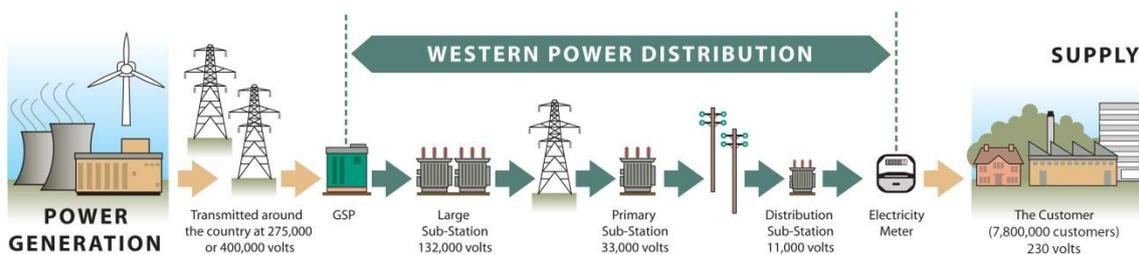
- 1 Revenues are profiled on a "Po/x basis"; revenues fall in 2015/16 and thereafter increase by 1.0% in real terms other than for DPCR5 IIS
- 2 DPCR4 losses excluded because of uncertainty
- 3 Smart metering included
- 4 K factor included in 2014/15
- 5 DPCR5 tax trigger impact included in 2014/15 and thereafter zero
- 6 DPCR5 IIS included in 2014/15, 2015/16 and 2016/17 and thereafter zero
- 7 IFI and LCNF included for DPCR5; NIA and NIC excluded for RIIO-ED1
- 8 Business bill represents Profile 3

In conclusion

2.54 We have developed a plan that improves network performance, provides excellent customer service and facilitates a move to a low carbon future. This plan balances the needs of investors, customers, stakeholders and the environment.

3 Who we are and what we do

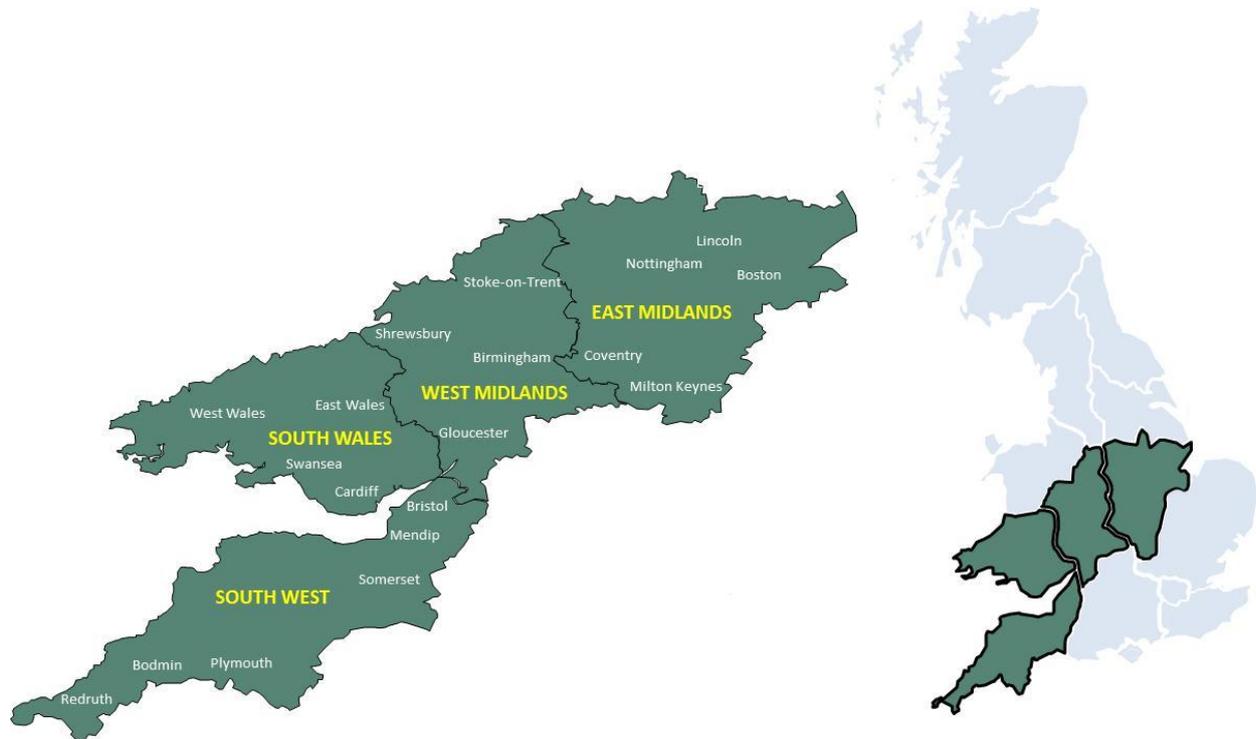
- 3.1** Western Power Distribution (WPD) is an electricity Distribution Network Operator (DNO). We are responsible for the network of engineering assets that allows the distribution of electricity to customers' premises from the National Grid.
- 3.2** WPD does not buy or sell electricity, or send any bills to electricity customers.
- 3.3** What we do is simple and comprises four key tasks:
- we operate our network assets effectively to 'keep the lights on' for our customers;
 - we maintain our assets so that they are in a condition to remain reliable;
 - we fix our assets if they get damaged or if they are faulty;
 - we upgrade the existing networks or build new ones to provide additional electricity supplies or capacity to our customers.
- 3.4** All of these tasks are carried out having the highest regard to levels of safety, whether that is to members of the public, contractors or our own operational staff.
- 3.5** Our distribution network consists of transformers (which convert electricity from one voltage to another), underground cables and overhead lines (which carry electricity across long distances), switches (to turn on, off or to alter the routing of electricity) and service connections (which take the electricity into customers' premises).
- 3.6** This network sits between what was traditionally known as the National Grid transmission network and customers.
- 3.7** The network we operate covers a geographic area of some 55,500 km² serving 7.8 million customers.



- 3.8** The WPD network currently comprises:

Network Assets							
Asset Type	Units	West Midlands	East Midlands	South Wales	South West	WPD Total	WPD total as a percentage of all DNOs
Overhead Lines	km	24,000	22,000	18,000	28,000	92,000	33%
Underground Cable	km	40,000	50,000	17,000	22,000	129,000	24%
Transformers	each	50,000	43,000	40,000	52,000	185,000	31%
Switchgear	each	87,000	98,000	35,000	76,000	296,000	25%
Poles	each	372,000	291,000	283,000	442,000	1,388,000	34%
Towers (Pylons)	each	4,000	6,000	3,000	4,000	17,000	34%
Customer Numbers	each	2,470,000	2,619,000	1,108,000	1,561,000	7,758,000	28%
Licenced Area	km ²	13,300	16,000	11,800	14,400	55,500	24%

3.9 Our network is the largest in the UK, covering every kind of geography and demography from densely populated residential areas to widely dispersed rural communities. We operate from the Lincolnshire coast in the East Midlands, through to Gloucestershire in the West Midlands, to Monmouthshire and Pembrokeshire in South Wales, and down into the South West to the counties of Somerset, Devon and Cornwall.



3.10 Our teams are based in local offices where they take responsibility for local issues, deliver local work programmes and respond quickly to local power cuts.

3.11 At WPD we try to get whatever we are delivering right first time. To encourage this we stress that all employees should:

- take personal responsibility;
- follow the problem through until the end;
- work with others to find a solution;
- keep the customer informed;
- follow our Golden Rule – treat customers the way you would like to be treated.

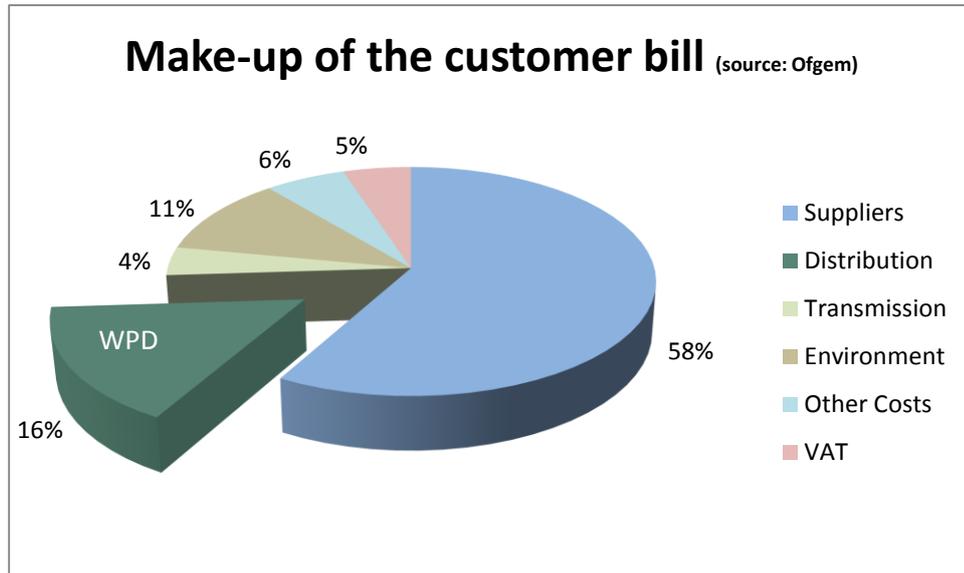
3.12 We continue to look for and make use of innovative techniques and encourage creativity so that we carry out all of our work in an effective and efficient manner. This helps to ensure value for money for our customers, stakeholders and the right return for our shareholders.

3.13 Although we are facilitating competition in some of the services we provide (such as new connections) we are a natural monopoly within the geographic area we serve. We are, therefore, regulated by the Office of Gas and Electricity Markets (Ofgem).

3.14 Ofgem issues licences to DNOs that set out the obligations and responsibilities of the companies and also determines the revenues they are allowed to earn each year. WPD has four licences covering the four geographic areas of the West Midlands, East Midlands, South Wales and the South West.

3.15 Periodically, Ofgem scrutinises the Business Plans of DNOs through a process known as a Distribution Price Control Review. This determines how much DNOs are allowed to charge in total per year for network investment, operating costs and allowed returns.

3.16 This charge, known as DUoS, is payable by the electricity suppliers who, in turn, incorporate it into electricity charges to customers. Our costs account for around 16% of the make-up of an average domestic customer's bill.



4 Our track record

Delivering our promises

- 4.1 The Business Plan sets out our forward thinking to deliver outputs at efficient cost but it is important to recognise that this is the continuation of an excellent historic performance within WPD.
- 4.2 We have a demonstrable track record of setting out high quality, accurate plans and then consistently delivering on our commitments. Our record supports our confidence in this Business Plan and our ability to deliver it.
- 4.3 Our track record has informed our plans and is discussed in more detail in Supplementary Annex (SA-08) Business performance, efficiency and benchmarking.

Reducing our costs following acquisition of the Midlands businesses

- 4.4 Financial analysis around the time of the acquisition of West Midlands and East Midlands (formerly Central Networks) indicated that we would make cost savings in the order of £108m per annum once the Midlands businesses were fully integrated into WPD.
- 4.5 We acquired the Midlands businesses on 1st April 2011 and within eight months had changed the Midlands organisation to the WPD team structure. In addition we had exited from expensive 'Alliance' and 'Turnkey' contracts and reduced overall staff numbers by over 800 despite increasing the number of direct field staff employed by over 200. We also harmonised terms and conditions of employment and implemented WPD IT and telecoms systems.
- 4.6 In the twelve months following the implementation of these changes we delivered savings, outperforming the original estimate:

Annual cost savings following acquisition of the Midlands businesses	
Cost Activity	Savings Per Year
Engineering management	£42m
Corporate activities	£20m
Network operating costs	£7m
Network investment	£50m
Total cost saving	£119m

- 4.7 Engineering management savings: this activity relates to the day to day management of network operations. Efficiencies have been delivered from the implementation of the flat geographic based WPD team structure and the discontinuation of the previous 'Alliance' and 'Turnkey' contracts that duplicated engineering management activity.
- 4.8 Corporate activity savings: these include head office functions such as finance, human resources and IT. Cost savings come from the scale efficiencies of having one set of head office functions.
- 4.9 Network operating savings: these costs are associated with network faults, inspection, maintenance and tree cutting activities. WPD has more efficient unit costs.
- 4.10 Network Investment savings: these costs are for the replacement of existing assets (equipment) or the reinforcing of an existing asset on the network. 'Alliance' and 'Turnkey' contracts were prevalent in both West and East Midlands resulting in the network investment programme being

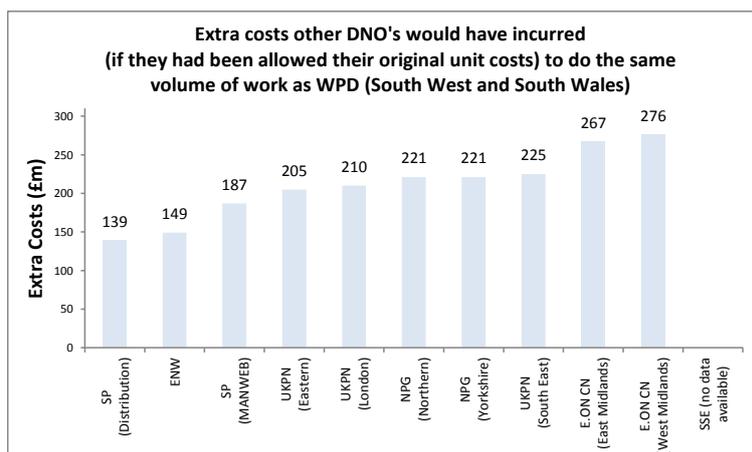
delivered by third parties. WPD employs direct staff to own the delivery of this activity and the savings are as a result of being both more efficient and not paying a profit margin to a third party.

Proven management of work delivery

- 4.11 WPD takes a long term view of network reliability and the related investment decisions required. Work programmes are completed to avoid creating a backlog for future customers.
- 4.12 The price control process requires each DNO to state the proposed volumes and costs of work. Ofgem analyses these submissions, benchmarks them across the industry, adjusts the volumes and determines an efficient amount of capital allowance. DNOs are then required to deliver those volumes in line with the level of expenditure that is allowed.
- 4.13 WPD has a very good track record of delivery in line with the volumes and financial settlement agreed with Ofgem. We have demonstrated over successive price controls the establishment of robust work programmes, the setting of clear targets and the delivery of those activities.
- 4.14 However WPD also has an excellent track record of being able to adapt to changed circumstances where it becomes necessary. Should this occur we make quick decisions, establish revised work programmes, set new targets and ensure we deliver against these adjusted work programmes.
- 4.15 An example of this would be in how we deal with a specific type of switchgear failure that is subsequently identified as having a defect specific to all of that type of equipment. This can occur at any time in a regulatory period and can involve significant volumes of equipment being affected. We can demonstrate our ability to adapt our programmes as necessary and alter budgets, without asking customers for more money, to ensure the delivery of the revised programme.
- 4.16 Our proven ability to adapt and reprioritise allows us to better deal with the uncertainty surrounding the take up of the LCTs through RIIO-ED1.

Proven efficient cost of delivery

- 4.17 WPD's business model, using locally based insourced staff, leads to work being delivered at low costs. This also has the benefits of retaining expertise within the company and flexibility where staff can be quickly redirected.
- 4.18 In setting allowances, Ofgem benchmark the DNOs to determine an efficient unit cost for each type of investment activity.
- 4.19 For DPCR5, replacement work accounts for 54% of all DNO network investment costs. Within Ofgem's benchmarking, South Wales and South West were assessed as having the most efficient unit costs for capital replacement works of all DNOs.
- 4.20 WPD unit costs were significantly lower than other DNOs in the first DPCR5 submissions made to Ofgem in 2007/08. The chart below illustrates the extra costs that companies would have incurred in delivering the South West and South Wales programmes if they had been allowed their submitted unit prices. The same work completed by the other DNOs would cost between £139m and £276m extra.



- 4.21** As a result of the WPD efficient costs being below the average and in recognition of the capital efficiency that WPD has been able to deliver, Ofgem rewarded WPD with an additional £66m capital allowance for DPCR5. WPD took the decision to use this additional allowance by investing it in further network automation. This will lead to better levels of reliability and service to our customers.
- 4.22** This difference was also used to demonstrate the potential efficiency savings that could be achieved following the acquisition of the East Midlands and West Midlands businesses. Under previous ownership, costs in these DNOs were the highest in the industry and they are now being driven down to the same level as the South Wales and South West businesses by the application of WPD working practices.
- 4.23** More details on business efficiency can be found in the Supplementary Annex (SA-08) Business performance, efficiency and benchmarking.

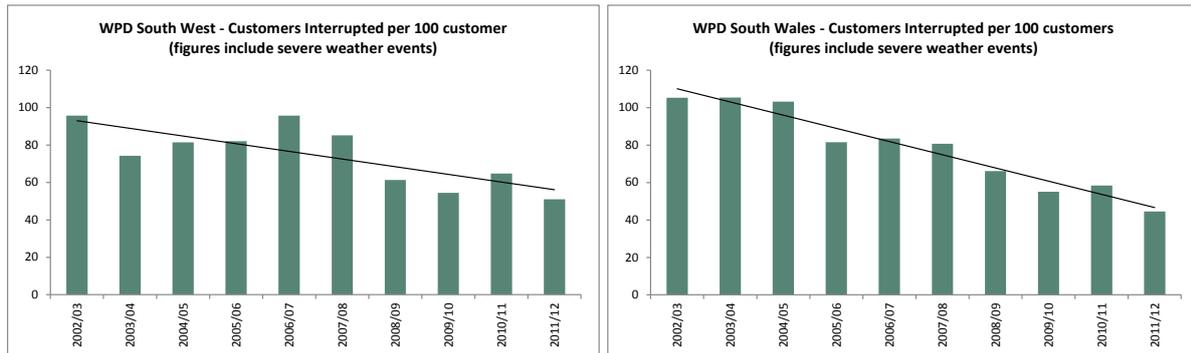
Proven management of network performance

- 4.24** WPD has a proven track record of improving the network reliability for customers. A number of measures exist for determining how well a distribution business is performing.

Customers Interrupted (CIs)

- 4.25** One measure is to record how many times customers are without an electricity supply for any duration over 3 minutes (measured per 100 customers). The data is externally audited annually to ensure we are correctly monitoring and accurately recording the impact on customers.
- 4.26** For DPCR5 we set out to outperform on the CI targets as set by Ofgem by at least 10% in both South West and South Wales businesses.

4.27 The long run performance trend of the South West and South Wales businesses including the effects of severe weather events is shown below:



4.28 By 2011/12 we had outperformed the CI target by 27% in the South West and 33% in South Wales.

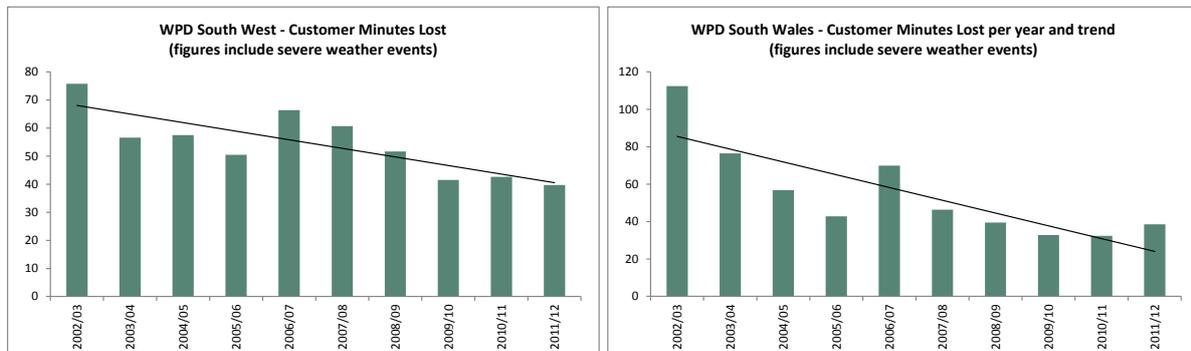
Customers Minutes Lost (CMLs)

4.29 In addition to how many times a customer might be off supply a further key measure is the actual number of minutes a customer is off supply on average. This is known as “Customer Minutes Lost”.

4.30 Our results in driving the number of customer minutes down reflects our desire and our ability to get the customer supplies back on quickly.

4.31 For DPCR5 we set out to outperform the CML targets as set by Ofgem by at least 12% in the South West and South Wales.

4.32 The long run performance trend improvements of our South West and South Wales businesses are shown below:



4.33 By 2011/12 we had outperformed the target by 22% in the South West and 30% in South Wales.

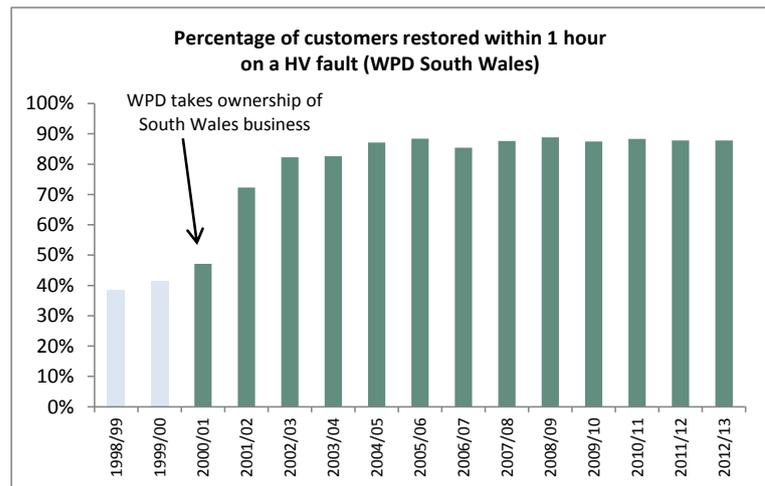
Target 60

4.34 One mechanism used by WPD to drive down the time for restoration is to have an internal target for the percentage of customers restored within 60 minutes of a high voltage (HV) fault, known as “Target 60”.

4.35 All of WPD’s staff recognise the importance of getting the maximum number of customers restored in the shortest time that they can. Healthy competition between operational teams ensures that the level of performance continues to improve. This has the consequential effect of reducing the average customer minutes lost.

4.36 Target 60 performance is displayed in all of the WPD depots and is monitored within the regional and executive board level key performance indicators.

4.37 The Target 60 philosophy was implemented in South Wales following WPD’s acquisition of the business in 2000. The effect was both immediate and significant, as can be seen in the following chart:



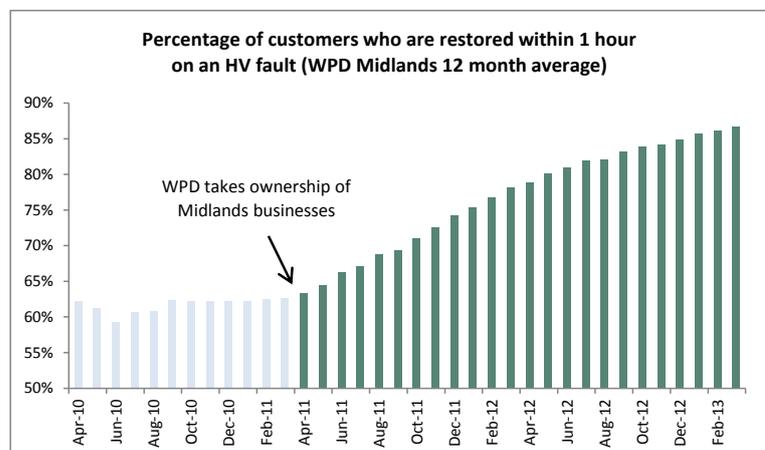
Target 60 performance in the Midlands following acquisition

4.38 Following the acquisition, in April 2011, of the Midlands businesses WPD set about changing working practices, providing clarity of business objectives to staff and applying greater managerial focus and commitment - in particular to the speedy restoration of electricity supplies in the event of a fault.

4.39 Key to this focus was ensuring that all staff understood that WPD was fully committed to improving the Midlands performance to match that capable of being achieved in both the South West and South Wales.

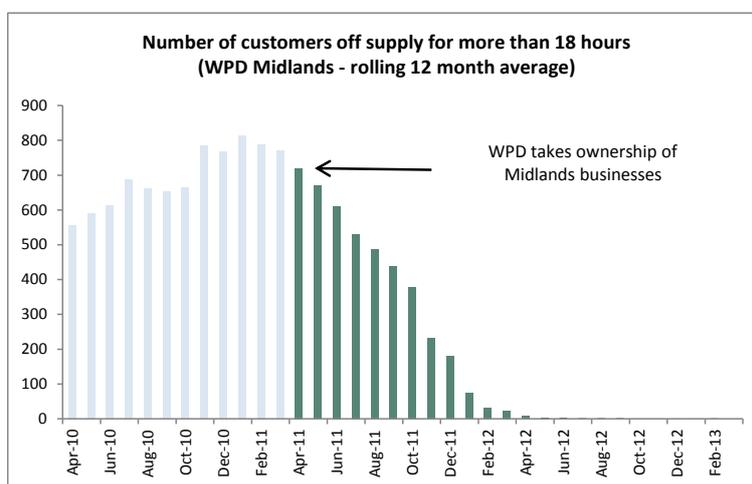
4.40 In the first month of WPD ownership, the Midlands areas were able to increase the number of customers restored within 60 minutes by over 10%. This was bettered to 15% in the second month and after the first full year of WPD ownership had been improved by 25% over the previous year.

4.41 This improvement has continued through the second year of WPD ownership and to date now stands at 36% higher than under the previous ownership. Almost 87% of Midlands customers are now being restored within one hour of an HV fault occurring.



Restoration of supplies within 18 hours

- 4.42 DNOs are required to report the number of times customers are without a supply of electricity for a period that exceeds 18 hours. A Guaranteed Standard of Performance (GSOP) exists that entitles customers to a compensatory amount of money.
- 4.43 WPD has always strived to ensure that it minimises the number of customers who suffer the inconvenience of being off supply for more than 18 hours.
- 4.44 Our performance levels have been the best of all DNOs for a significant period of time and have averaged less than 5 per annum on a rolling 12 month basis.
- 4.45 In contrast at acquisition the East and West Midlands businesses averaged some 800 customers per month who remained off supply for a period exceeding 18 hours duration.
- 4.46 We set out to dramatically lower the lower the number of customers in the Midlands being subject to these longer duration faults and in the first month of ownership of the Midlands businesses WPD was able to decrease the number of customers remaining off supply after 18 hours by over 87%. After our first full year of ownership the reduction achieved was in excess of 96%.



- 4.47 This improvement has continued throughout our second year of ownership with only 14 customers being affected out of a customer base of over 5 million. This contrasts with 9,463 customers affected over a similar period in the last year under previous ownership.
- 4.48 These incidents have been virtually eliminated through the commitment of staff and the use of more innovative measures to restore supplies. This focus and the consequent levels of improved performance allows WPD to be able to move readily towards a new measure under RIIO-ED1 of “customers who remain off supply for 12 hours”.

Proven delivery of excellent customer service

- 4.49** Our simple Golden Rule, ‘Treat customers the way you would like to be treated’, has become second nature to all WPD staff. We empower staff and expect them to take ownership of any problems, concerns or complaints that customers may bring to us and to ensure that these are followed through with the customer being kept regularly informed. We do not transfer customers unnecessarily or ‘bounce’ them from one department to another.
- 4.50** This simple philosophy has enabled WPD to be recognised as the top performer in respect of customer satisfaction.

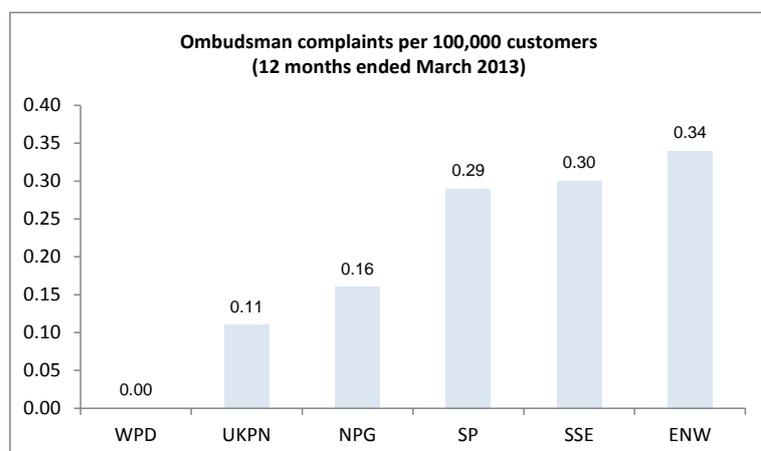
Ofgem’s Broad Measure of Customer Satisfaction (BMCS)

- 4.51** Ofgem introduced the Broad Measure of Customer Satisfaction (BMCS) in the final proposals for DPCR5 that were to become effective in April 2012. Our corporate objective was to be ranked consistently in the top quartile under the new measures.
- 4.52** We conducted surveys from May 2011 to allow us to understand any areas of our delivery where our customers felt we could improve.
- 4.53** As a result of our own surveys we made a number of changes within the business to improve our customer service delivery ahead of the BMCS going live.

- 4.54** Since the formal introduction of the BMCS in April 2012, customer responses have consistently placed the four WPD businesses in the top five places. The results of the various questions are combined into an overall score for each DNO. This allows comparison across all of the 14 licenced DNO businesses.

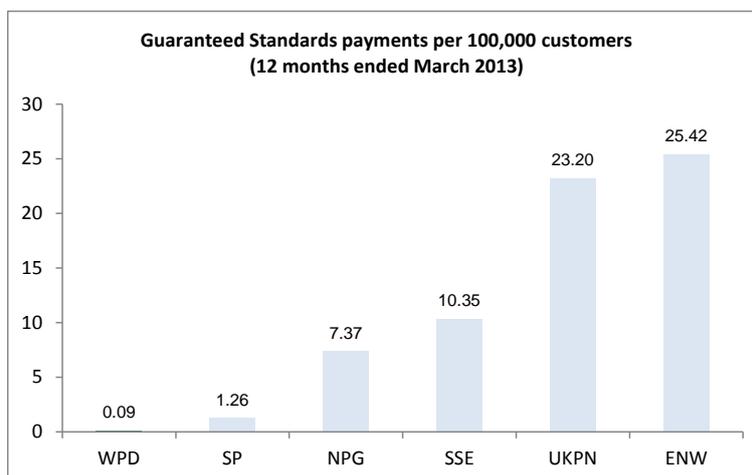


- 4.55** The BMCS also measures the number of complaints that are upheld by an independent assessor called the Ombudsman. The WPD companies are ranked 1st, 2nd, 3rd and 4th in respect of best performers. In the 12 months ended March 2013 the four WPD businesses had zero complaints. In fact it is now 8 years since WPD South West or WPD South Wales have had a complaint against them upheld.



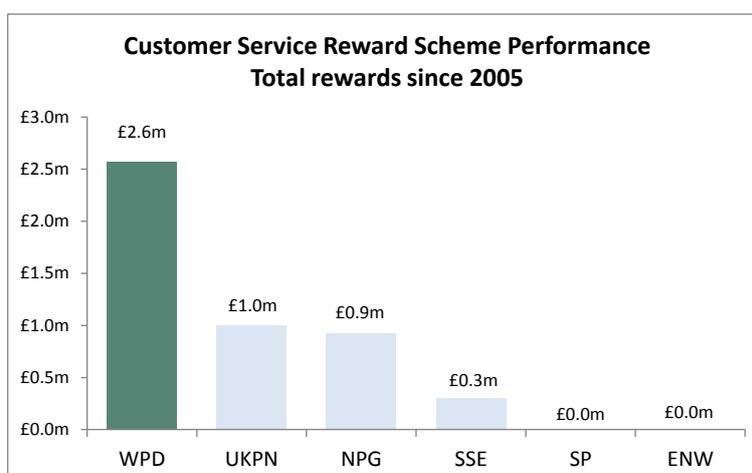
Guaranteed Standards of Performance (GSOPs)

- 4.56 Another measure of customer delivery is in respect of the volume of payments that a DNO must pay where it fails to comply with a range of different minimum GSOPs.
- 4.57 Our objective is to be the best performer with respect to GSOPs throughout the DPCR5 period.
- 4.58 Again WPD leads the way with the lowest payments per 100,000 customers.



Ofgem Customer Service Reward Scheme

- 4.59 From 2005/06 to 2010/11 Ofgem conducted an annual Customer Service Reward Scheme for DNOs, designed to encourage innovation and improvements in customer service. Rewards were made to companies that were judged, by an independent panel of industry experts, to have exceeded their licence requirements and demonstrated that they are continually serving the best interests of customers.
- 4.60 The categories covered by the scheme included priority customer care, wider communication strategies and corporate social responsibility.
- 4.61 The WPD businesses were the top performers and recognised in every year of the scheme. WPD received the highest number of rewards of any DNOs and were commended for continually leading the way with innovations in customer service.



Proven delivery of reducing our environmental impact

4.62 In our plans for the DPCR5 period, we set out to deliver increased levels of environmental performance when compared to 2009/10 against seven key targets.

4.63 Within three years we have already met three of the targets:

- reduced CO2 emissions per vehicle by 5%;
- reduced the volume of waste being sent to landfill by 5%;
- reduced our own electricity usage in offices by 5%.

4.64 The remaining four targets have progressed significantly and are on track to deliver within the DPCR5 timeframe. These are to:

- increase our investment recovery (the recycling of scrap and equipment no longer required) by 5%;
- reduce the volume of SF6 gas leakage from our installed equipment by 25%;
- reduce the loss of oil from fluid filled cable leaks by 5%;
- complete a programme to establish oil retaining 'bunds' around 100% of our transformers (high volume oil filled transformers rated at 33kV and above) to prevent inadvertent ground pollution by oil. This has already been completed in South Wales and will be complete in the South West by the end of 2013.

4.65 In addition to the original seven targets we have obtained ISO 14001 certification for environmental management across all of our Midlands depots. This will be extended to South Wales by the end of 2013 and South West by the end of 2014.

Record of business-wide innovation

4.66 Innovation is not purely about studies, reports and large projects but is about real changes in working practices that deliver benefits to our business and our customers. Innovation happens across the WPD business and our willingness to adopt and embed innovations into our operating practices has contributed to making WPD the most efficient DNO group.

Technical and operational innovation

4.67 Technical innovation enhances working methods, speeds up processes and improves network performance. WPD has a history of developing and implementing a number of technical and operational innovations such as:

- using 'ENMAC Mobile' - that allows field staff to request and receive operational instructions on hand held devices and to provide real-time job-status updates. This significantly reduces the need for two way dialogue between field staff and the control room speeding up communication and allowing activities to proceed without delay.
- using mobile switchboards and high voltage generation for faster restoration of faulty equipment and quicker restoration of customer supplies;
- training apprentices in house and utilising a WPD developed 'Task completion' approach rather than NVQ modules reducing bureaucracy and allowing greater control and efficiency in the training of apprentices.

Customer service innovation

4.68 We have gained industry leading customer service by being innovative in how we interact with customers. Some examples of what we have done include:

- working in partnership working with WRVS (now known as RVS), British Red Cross and other organisations that can assist vulnerable customers and with Warm Front and National Energy Action in respect of fuel poverty;
- calling customers back to keep them updated about supply interruptions and to check that they are back on supply rather than expecting the customer to call us;
- 'Ramping up' contact centres – we have trained general office staff specifically in the use of contact centre and call taking systems. In the event of bad weather or storms we are able to increase the number of call takers significantly. This enables us to deal with high volumes of calls during the very busy periods whilst maintaining staff numbers at an efficient number for day to day work-loads. In addition we also enable staff to take calls from home by deploying contact centre systems into home locations. This ensures that the levels of service can be maintained even if staff are prevented from travelling to the office due to the severe weather.

Environmental innovation

4.69 We have established effective environmental management processes that have been assessed against ISO 14001.

4.70 We have undertaken a number of innovation and other projects which have a direct impact on the environment including;

- trialling the use of electric Transit vans and other small electric vehicles;
- refurbishing buildings to the highest BREEAM standards;

- applying PFT tagging of fluid filled cables - this adds a special tracer element to the oil that can then be detected from above the ground speeding up leak location, reducing the environmental impact of digging and reducing the volume of oil lost into the environment.
- completing the 'Registered Power Zone' (RPZ1) project which investigated the possibility of applying dynamic line ratings on the 132kV system. A traditional rating for how much load the conductor can carry is based on a one-off summer or winter calculation. By using wind speed and temperature sensors the rating of the line can be calculated continuously. This project was successful and its results are being developed into a WPD policy, marking the innovation's full implementation to become 'business as usual' in RIIO-ED1. The major benefit being that we can allow more LCTs to connect and avoid significant reinforcement costs that would have applied under a traditional approach.

Large scale innovation projects

4.71 Under Ofgem's Low Carbon Network Fund (LCNF), WPD has secured 5 of the 16 large scale projects funded through the competitive 'Tier 2' process and is managing 11 of the 31 self-certifying 'Tier 1' smaller projects. The following table summarises the scope of the five large projects aimed at developing networks that can deal with the challenges of low carbon technology.

4.72 These projects will enhance the speed and volumes of LCTs that can connect to our network:

Name	Project Description
LV Templates	This project uses statistical clustering techniques to identify patterns in electricity consumption behaviour. Nearly 1,000 substations are being monitored and analysis will develop an understanding of how low voltage networks can best cope with future demands of low carbon technology.
Project Falcon	Through this project we aim to get a better understanding of the dynamic nature of the utilisation of the 11kV network and to assess a number of alternative solutions to network reinforcement. It also aims to provide better knowledge of the IT and telecommunication requirements.
SoLa Bristol	This project aims to determine how community based battery storage can assist in deferring the need for network reinforcement by storing excess energy from photo voltaic generation and releasing it during peak demand. Providing large enough batteries for each customer would be prohibitively expensive and therefore lower capacity batteries are linked across the community taking advantage of the fact that customers use power at different times. The technology has been implemented in ten schools, one office and thirty homes.
Lincolnshire 33kV low carbon hub	This project aims to test methods for controlling load flows on the 33kV network in conjunction with new commercial arrangements with generators to avoid the costs that would normally be required for network reinforcement.
FlexDGrid	This project seeks to explore the potential benefits arising from trials of three complementary methods for managing fault level including enhanced fault level assessment; real-time management of fault level; and fault level mitigation technologies.

Proven record of resource recruitment

- 4.73** WPD has delivered its resource plans. Over the five year period from 2007 to 2012, in South Wales and South West, WPD recruited 307 staff to replace retirees and other leavers. 159 of the new recruits were apprentices joining our in-house industry respected apprentice training programme. Over the same period West Midland and East Midlands recruited 280 apprentices. All new apprentices are enrolled onto WPD's in-house scheme.
- 4.74** In the DPCR5 Business Plan, WPD submitted a need to recruit and train an additional 265 new staff specifically for the delivery of extra work programmes in DPCR5 and beyond. These staff were recruited, trained and established in front line roles within two years of the start of DPCR5.
- 4.75** WPD has the ability to train staff for all key operational roles within its own training schools based predominantly in two locations: Taunton in Somerset and Tipton in the West Midlands. With 32 skills trainers, 27 classrooms, 12 workshops and 5 training fields we are self-sufficient for the training of new starters, for the training of refresher courses for existing staff and for the 'upskilling' of existing staff in more advanced skills or operations.

Sharing best practice

- 4.76** WPD has always had an open approach with other companies in respect of demonstrating how we drive high standards of customer service and operational delivery. We continue to innovate throughout the business finding better ways to serve our customers and improve the efficiency of our delivery.
- 4.77** Likewise we are also keen to learn from other DNOs, utilities or related companies to ensure we apply best practices to our business. For example we have helped develop the cable fault sniffer from techniques used for gas leak location and incorporated self-quote packs for service alterations previously used in the gas industry.
- 4.78** We have regularly demonstrated and shared how we have achieved our very high standards with other DNOs or indeed other utility companies or other organisations who may wish to know. Ofgem has encouraged us to continue to do this as they can see the potential benefits to customers served by these other companies in respect of improved service levels and reduced costs.
- 4.79** Although the list below is not exhaustive it demonstrates that representatives from utility organisations including all of the other DNO groups have requested to visit and have been welcomed by WPD to review aspects of our customer service, operational IT systems or training school facilities and apprentice programmes.

Location	Business Activity	Visitors
Lamby Way, Cardiff, South Wales	Control, Contact centre, Operational despatch, High Volume Call Taker, Customer service.	Northern Power Grids, Scottish Power Manweb, Scottish and Southern, National Grid, Northern Gas, Wessex Water
Pegasus Office, Castle Donington, East Midlands	Control room, Operational despatch, Contact centre, Customer service, Stakeholder engagement	UK Power Networks, National Grid, Northern Gas, Wales and West Utilities, Severn Trent, Anglian Water, Scottish Power Networks, Scottish and Southern
Toll End Road, Tipton, West Midlands	Control room, Operational despatch, Contact centre, Customer service	Electricity North West
Avonbank, Bristol, South West	Information resources, Stakeholder engagement, ENMAC team, High Volume Call Taker, Customer services	UK Power Networks, Scottish Power Manweb, National Grid
Taunton Training Centre, Somerset and Tipton Training Centre, West Midlands	Skills training – overhead linesman, jointing and fitting, Apprentice programme, Graduate programme, Technical staff trainee programme, Operations training	Jersey Electricity, MANX Electricity authority, UKPN, ENA, ENW, S&SE, Environment Agency.

PAS 55 accreditation of asset management processes

- 4.80** Publicly Available Standard (PAS) 55 has been developed by the Institute of Asset Management as a standard for carrying out asset management. The standard covers 28 elements of asset management including the specification of objectives, risk management, performance and condition monitoring, development of work plans, progress monitoring, and continuous improvement, underpinned by the commitment of senior management.
- 4.81** As an asset intensive business, the approach taken to managing assets is critical to the long term operational and financial success of WPD. In recognition of this, WPD was the first DNO to attain accreditation against PAS 55 in 2006 and continued conformance is monitored through annual surveillance and 3-yearly recertification visits by Lloyds Register.
- 4.82** The last assessment was carried out in October 2012, where recertification was applied to all four licences. The auditors were impressed with how well the West Midlands and East Midlands businesses had been integrated into WPD in a very short time, finding consistency throughout the whole organisation. A letter from the auditors can be found at <http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Supporting-documents-overview/PAS55-auditor-s-letter.aspx>

5 Developing the plan for our business

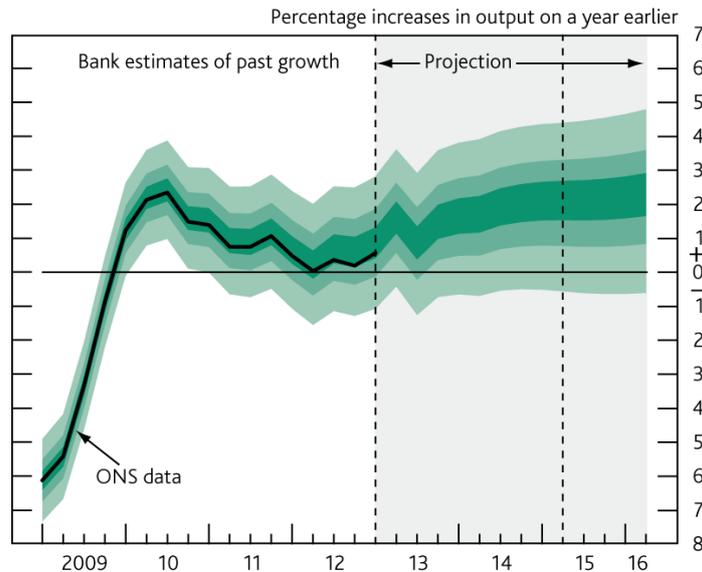
- 5.1** The WPD RIIO-ED1 Business Plan builds on WPD's excellent track record as the leading DNO.
- 5.2** It considers business objectives and stakeholder requirements in the context of the business environment and long term strategy.
- 5.3** Extensive planning, analysis and consultation have been used to ensure that the plan delivers benefits for current customers and sets the foundations for the future.
- 5.4** Expenditure forecasts have been derived by considering many sources of information such as:
- national forecasts of future energy use;
 - detailed analysis by independent expert organisations;
 - comprehensive modelling using specially developed third party tools;
 - bespoke in-house forecasting models;
 - the proposals and requirements from specific WPD teams with expert knowledge;
 - feedback from local teams on the observed state of the network;
 - regulatory frameworks and incentive mechanisms;
 - stakeholder views and requirements.
- 5.5** Stakeholder engagement is embedded in business processes and consultation is continuous. Since 2011, the focus of the engagement has been aimed at future requirements to be delivered in RIIO-ED1 and beyond. Stakeholder priorities, willingness to pay and scale of investment programmes have all featured in the consultations that have taken place.
- 5.6** Investment proposals continue the programmes developed for DPCR5, with refinements made for changes in the business environment and stakeholder requirements. The proposals have been under development since 2011 and an initial view of expenditure requirements was presented to Ofgem in July 2012. Since then, more detailed modelling and cost benefit analysis has led to updated proposals.
- 5.7** Senior managers with detailed knowledge of the business have contributed to the contents of the Business Plan. A core RIIO-ED1 group has co-ordinated the development of the plan and challenged the proposals to ensure that the work programmes meet the needs of the business and stakeholders.
- 5.8** The governance arrangements for controlling the development of the plan have been audited to confirm that robust arrangements were in place for recognising and managing key risks.
- 5.9** This has resulted in a well-balanced plan that improves network performance, provides excellent customer service and facilitates a move to a low carbon future.

Business environment

Economic conditions

- 5.10** The speed and scale of recovery from recession is uncertain. Bank of England projections (illustrated below) suggest that growth will continue at low levels leading up to the start of RIIO-ED1.

The Bank of England's May 2013 forecasts of GDP growth



- 5.11** This overall economic uncertainty carries over into uncertainty about growth in electricity usage and the number of new connections we can expect. It is also likely to impact on the willingness of customers to invest in LCTs as lower economic activity or confidence may delay capital investments by customers.
- 5.12** The introduction of any significant new subsidies to encourage LCTs is unlikely in the early part of the RIIO-ED1 price control period.

The Government's carbon reduction objectives

- 5.13** The UK Government has committed to undertake positive action on climate change by reducing the emission of greenhouse gasses and has developed a roadmap within its Carbon Plan.
- 5.14** For WPD the major impact will be changes to the network for LCTs used for electricity generation, transportation and heating. Part of WPD's role is to enable cost effective and timely connection of distributed generation (such as solar panels) and to provide sufficient capacity in the network to accommodate the increased loads from electric vehicle charging and heat pump domestic heating systems.
- 5.15** DECC has established forecasts for the scale of uptake of LCTs which will require the distribution networks to increase capacity and be more flexible to deal with fluctuations in generation and demand.

Changes to European Union (EU) legislation

- 5.16** The EU is considering the introduction of new legislation for the energy efficiency of 'small' transformers. This would require all new distribution transformers to be constructed to reduce electrical losses.
- 5.17** It is estimated that the cost of a transformer would double as a consequence. This price increase would add approximately £5m per annum to the costs of asset replacement and load reinforcement programmes.
- 5.18** As the timing and specific requirements are unknown, current cost forecast assume that the change does not occur during RIIO-ED1, but will have an impact in the longer term.
- 5.19** Other changes to EU legislation are detailed in the Supplementary Annex on Uncertainty (SA-06).

Business objectives

Business objectives

- 5.20** WPD's business objectives are simple. They are:
- to minimise the safety risks associated with WPD's distribution network;
 - to improve the reliability of electricity supplies and to make the distribution network more resilient;
 - to reduce WPD's impact on the environment and to facilitate low carbon technology;
 - to consistently deliver outstanding customer service;
 - to meet the needs of vulnerable customers;
 - to engage with our stakeholders;
 - to be efficient, effective and innovative in everything we do.

Returns for shareholders

- 5.21** In summary the main objective of the business is to deliver frontier levels of performance at an efficient level of cost.
- 5.22** The achievement of frontier performance will be reflected in a high return on regulatory equity (RORE), thereby rewarding our shareholders with an equity return above the 6.4% base assumption in our updated Business Plan.

Long term strategy

- 5.23** WPD's long term strategy is to deliver our business objectives through an efficient, flexible and scalable organisational structure; evolving to accommodate the challenges of the future.

Efficient organisational structure

- 5.24** The current flat organisational structure with locally based teams of in-sourced labour has been the foundation of WPD's success. It gives responsibility to front line staff to deliver work programmes and the absence of multiple layers of management minimises costs.
- 5.25** There are no plans to change this successful business model.
- 5.26** One of the big advantages of the geographical team structure is scalability. More staff can be added to an individual team where increases in future work cluster together or additional teams can be created where there are more widespread increases in workload. These changes can be achieved quickly.
- 5.27** The structure also enables WPD to refocus effort and resources very quickly to those areas that require it either on a short term or permanent basis.

Self-sufficiency

- 5.28** WPD's resourcing strategy is to use in-sourced labour. This ensures that knowledge is retained, allows greater flexibility to redeploy staff where needed and builds a strong culture of staff motivated to deliver business objectives.
- 5.29** The development of in-house apprentice schemes, training facilities, technical knowledge, operational capability and bespoke systems increases the self-sufficiency. This allows the business to respond quickly to new requirements and obligations and have better control over succession planning.

Investment in technology and innovation

- 5.30** Developing better ways of doing things is encouraged throughout the business. Innovative ideas are captured, tested and rolled-out into the business on a regular basis.
- 5.31** Technology can provide benefits of improved performance or efficiency. The deployment of technology is carried out in a way to ensure that compatibility is maintained. This applies equally to IT equipment, communications infrastructure and the roll out of new innovative network management techniques.

Understanding the long term needs of the network

- 5.32** Network monitoring, independent information sources and modelling techniques are used to predict investment requirements into the long term.
- 5.33** Asset replacement forecasts show that in the future more investment will be required to replace an ageing cable population. Monitoring of fault rates and analysis of causes will enable targeted investment programmes to be established. An example where this already exists is in the replacement of Consac cables that were installed in the 1970s but have since been found to have a greater than average fault rate.
- 5.34** DECC LCT forecasts suggest that there will be extensive requirements for network reinforcement growing exponentially into RIIO-ED2. Smart solutions are being trialled utilising innovation funding to develop lower cost ways of providing network capacity.

Economically doing more than the legal minimum

- 5.35 As a minimum the activities carried out aim to comply with licence obligations and the Electricity Act. Where identified as being in line with our business objectives, additional activities will be carried out to provide better service or provide additional network capacity.
- 5.36 This approach ensures that our incremental investment above legal requirement is made to bring about clearly identified benefits to our customers, stakeholders and our business.

Completing work programmes

- 5.37 WPD does not delay work programmes. Whilst short term savings would provide a financial benefit under the regulatory efficiency incentive (IQI) such action is not commensurate with providing a longer term reliable network for customers.
- 5.38 Unless objectives change, work programmes are completed.

Adapting the network for climate change

- 5.39 We engage with DECC and the industry to identify common climate change impacts and set about implementing changes to ensure that our networks remain reliable into the long term future.
- 5.40 We have used available projected climate data to assess risks resulting in three priority areas relating to increased lightning activity, flooding and impact of temperature rise on overhead lines.
- 5.41 Lightning activity is predicted to increase across the whole WPD area. Even in the medium term, by the end of the RIIO-ED1 period, we expect activity to increase by up to 11% in the South West and East Midland areas. The effects are being mitigated by adding lightning protection devices to the network.
- 5.42 Site specific flood risk assessments are used to identify the most prudent method to adopt. Mitigation measures include protection of individual items, protection of buildings, protection of the site as a whole or in extreme cases site relocation. This is also considered for the siting of new infrastructure.
- 5.43 Predicted increases in ambient temperature will not only mean that thermal expansion will affect the overhead line clearances but also the thermal loading limits will be reached more quickly. We have introduced new overhead design requirements including new conductor ratings and increased ground clearance requirements for overhead lines to ensure our network remains compliant and resilient.

Governance of Business Plan development

- 5.44** The Business Plan has been developed following extensive engagement with our stakeholders, ranging from domestic customers and large users to electricity suppliers and Ofgem. We have listened to all of our stakeholders to ensure we formed a balanced view as we developed this Business Plan.
- 5.45** The RIIO-ED1 project governance structure was set up and agreed by the Executive Management Council in September 2011 to ensure clarity of roles and responsibilities along with a formal and accountable reporting structure. An overview of the project structure is below:



- 5.46** The WPD Board has been fully involved in the development of this Business Plan. The proposals we have set out deliver the company's objectives while providing real value for money.

6 Developing the plan for our stakeholders

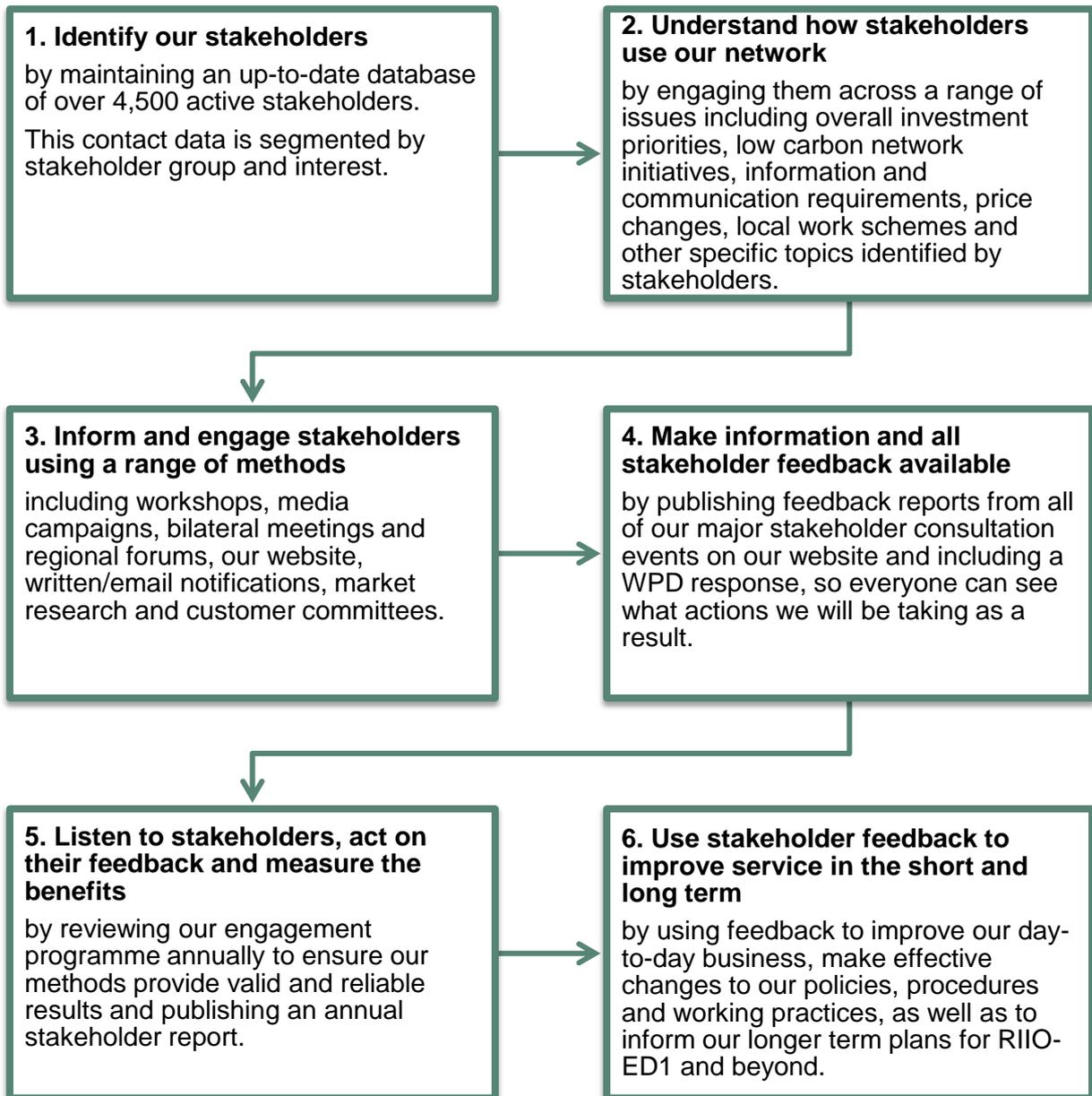
- 6.1 WPD regularly engages with stakeholders.
- 6.2 Stakeholder engagement is embedded in our business. True improvements in customer service and business delivery come from understanding the areas where we can do better.
- 6.3 On an on-going basis we undertake a wide range of engagement activities with different stakeholders including:
- domestic and business customers;
 - major energy users and suppliers;
 - local authorities;
 - parish councils;
 - other DNOs;
 - other utilities (including electricity suppliers);
 - environmental groups;
 - regulatory bodies;
 - vulnerable customer representatives;
 - emergency planners;
 - educational institutions;
 - connections customers;
 - distributed generation customers and developers;
 - future customers;
 - all WPD staff.
- 6.4 Stakeholders have influenced and shaped all aspects of the Business Plan.

What sets our stakeholder engagement apart

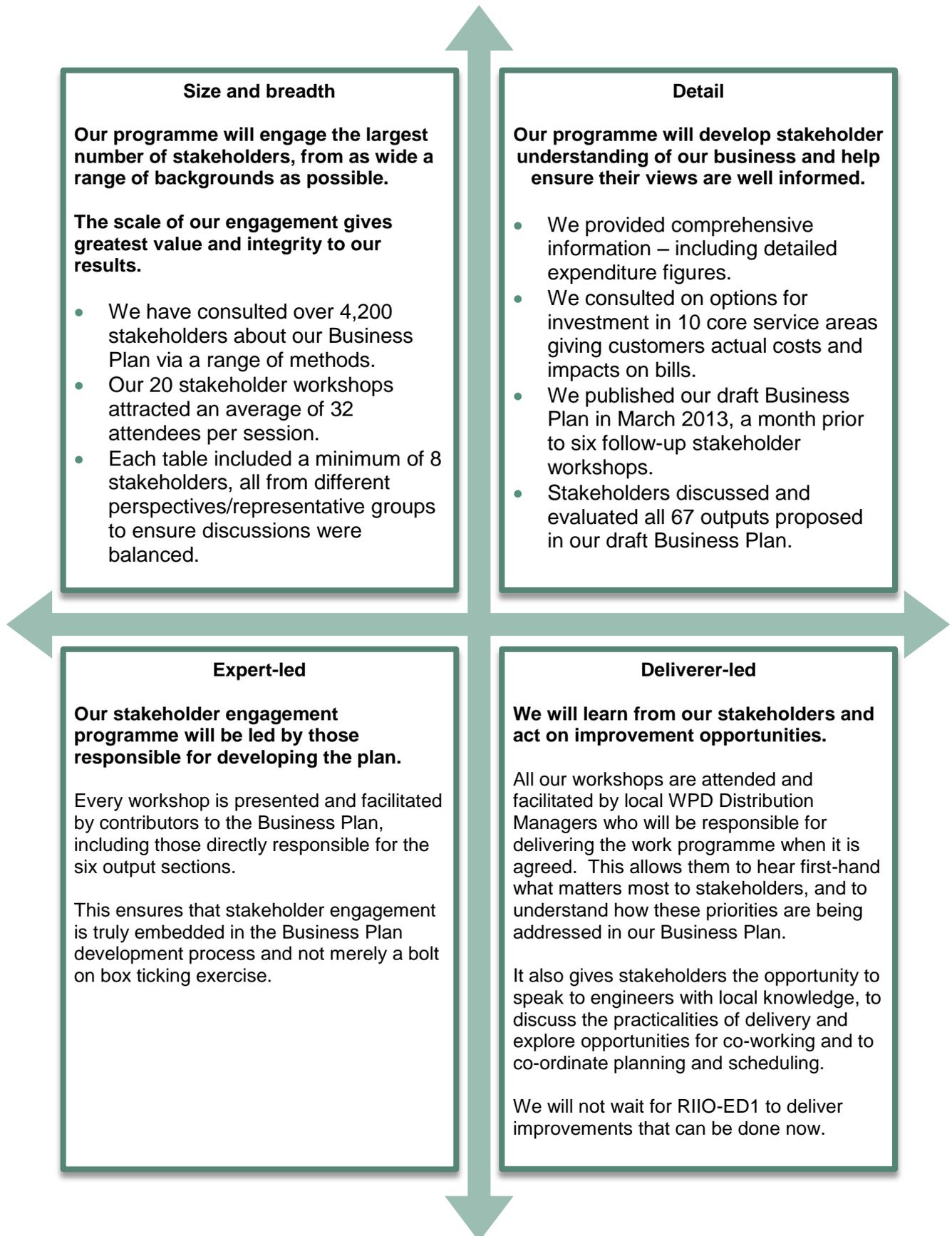
- 6.5 Breadth and quality:** We have engaged with over 4,200 stakeholders on our RIIO-ED1 Business Plan. Many different stakeholders have been involved throughout the process and have become more knowledgeable about our business. This has enabled them to critically evaluate our plans in considerable and increasing detail. We place a strong emphasis on talking directly to stakeholders face-to-face at events co-facilitated by WPD staff.
- 6.6 Business-led:** Stakeholder engagement is not separate to our day-to-day activities. Members of the WPD senior management team, including local Distribution Managers, who will be responsible for operationally delivering the work, have facilitated our stakeholder workshops so they can learn from our customers first hand.
- 6.7 Transparent:** After every stakeholder event we publish an independent report of the findings, followed by a WPD response including an action plan for how we will act on our stakeholders' feedback.
- 6.8 Innovative:** We use a wide range of engagement methods and are innovative in our approach. WPD's fourth annual customer awareness campaign began in February 2013 with the unveiling of a brand new TV advert - a bold and novel approach to engagement with millions of customers who have little prior knowledge of WPD. The month-long 'Power for life' campaign, including the screening of the TV advert, also included local newspaper advertising and a four-page leaflet delivered to every home and business in our region, which invited customers to participate in our stakeholder workshops.
- 6.9 Inclusive:** We have given 'future bill payers' the opportunity to have a say in our plans, through bespoke university events. We also recognise WPD staff as key stakeholders. WPD's Chief Executive personally conducts 50 staff road shows each year, seeing over 6,100 staff, to communicate the key aspects of our business plans and the role staff will play in delivering our promises to customers.
- 6.10 Valued by stakeholders:** Our stakeholder workshops have received 99% satisfaction ratings from the participants for usefulness and value.
- 6.11 A phased approach:** Stakeholders have influenced and helped to shape all aspects of our Business Plan. We have used a phased approach with our stakeholders to build our Business Plan. We began by identifying broad stakeholder priority areas, then developed these into specific proposals for service level improvements, gave stakeholders multiple options for investment including costs, before finally consulting on our draft Business Plan in full, including all proposed outputs.

Our stakeholder engagement strategy

6.12 Our CEO reviews and approves our stakeholder engagement strategy annually. The strategy is to:



6.13 When devising our RIIO-ED1 stakeholder engagement programme, we chose to extend our core engagement approach. To ensure our consultation programme was of the highest quality, scope and effectiveness, our stakeholder workshops and events have been underpinned by 4 key goals:



Our approach to stakeholder engagement for RIIO-ED1

6.14 Our RIIO-ED1 engagement programme has the following five phases:

Phase	Timing	Objective
1 - Preliminary engagement	January 2010 – December 2011	To ensure all stakeholders' interest areas have been recognised and suitable representatives identified. We also sought to understand their preferred method of communication and to hear first-hand the issues that most concern them.
2 - Willingness to pay research	January 2012 – August 2012	To group stakeholders' priorities into common areas for focus within the Business Plan, to identify specific levels of service improvement achievable under each priority area and to understand customers' 'willingness to pay' for improved performance.
3 - Business Plan development and consultation	September 2012 – July 2013	To provide stakeholders with the opportunity to shape the WPD Business Plan by presenting stakeholders with options for network investment, the level of service improvement each option would deliver, the overall costs and the impact on the average electricity bill.
4 - Business Plan outcomes	July 2013 – Ofgem decision (February 2014)	To communicate how we incorporated stakeholder feedback into our Business Plan, highlight any significant changes from our previous proposals, and to identify the key performance measures stakeholders would like us to use to monitor our progress and enable them to hold us to account for delivering on our promises.
5 – Business Plan delivery/performance review	April 2015 onwards	To provide an update on our progress in delivering the investment plans, our performance against key output measures and to identify areas of emerging stakeholder interest or concern.

Our methods of engagement:

- 6.15** We have used a range of engagement methods, tailoring them to individual stakeholder's knowledge, interest and understanding of our business. Since 2010, we have engaged with over 4,200 external stakeholders specifically on our plans for RIIO-ED1, via:
- 20 stakeholder workshops (with a wide cross-section of stakeholders);
 - 2 'future customers' workshops (with university students);
 - 2 'social obligations' workshops (with vulnerable customers, representatives and agencies);
 - 7 Customer Panel meetings (with "expert" stakeholders);
 - 8 focus groups (with domestic customers);
 - 1,208 'willingness to pay stated preference' interviews (with domestic customers);
 - 426 'willingness to pay stated preference' interviews (with business customers);
 - 6 connections and distributed generation surgeries;
 - 774 distributed generation customer interviews;
 - 408 vulnerable customer surveys (with customers on the Priority Service Register);
 - 2 energy supplier forums;
 - 50 staff roadshows.
- 6.16** Following stakeholder workshops, Customer Panel meetings and willingness to pay research, we publish reports on our website detailing all of the feedback received, as well as a WPD response outlining the conclusions we have reached and how this will impact on our plans.
- 6.17** Examples of our key methods of engagement, per stakeholder knowledge and interest level, include:

Level One – Expert:

WPD Customer Panel

- 6.18** We have established a permanent Customer Panel that gives a broad range of stakeholders the chance to shape our thinking and future priorities at a strategic, highly informed level.
- 6.19** The Customer Panel is attended by WPD's Chief Executive and members meet quarterly to voice their opinions, concerns and ideas in an open forum.
- 6.20** The Customer Panel has been in place since 2009.
- 6.21** Through their expert knowledge, the Customer Panel is able to shape our broader strategic thinking and offer expert analysis and refinement of our Business Plan as a whole. Outputs from all meetings are published on our website, with detailed minutes and actions formally recorded.
- 6.22** Each Customer Panel member represents one of our stakeholder segments. The Customer Panel's membership is therefore regularly evolving to ensure it continues to be representative of our diverse customer base. Growing from 11 original attendees, there are now 20 permanent members from regional and national groups including: the British Red Cross, Major Energy Users' Council, B&Q, Energy Saving Trust, the Co-Operative, RVS, Warwickshire Police, Severn Trent Water, West Coast Energy, Clearwell Parish Council and Lincoln University.



WPD Customer Panel – Joint statement of endorsement from members

“Western Power Distribution (WPD) was the first DNO to adopt open and enduring stakeholder engagement, long before RIIO-ED1. They have led the way by giving stakeholders a clear say and involvement in strategic decisions for the future of the business.

WPD’s Customer Panel was the first of its kind and currently enables us to regularly meet the senior company managers, see the company at work and learn more about what WPD is doing, where and when. The transparent and open approach affords us the opportunity to comment on policy and feedback concerns and suggestions to management and key decision makers directly.

Collectively the professional experience and knowledge of the invited members have enabled consideration of the outputs proposed by WPD for RIIO-ED1 in order to submit a plan that would be most beneficial for stakeholders and customers. WPD respect both positive and negative responses and address issues accordingly.

WPD’s approach to engagement is transparent, genuine and well thought out, using a wide range of methods. Meetings are a worthwhile use of our time as we see our suggestions implemented to ensure customers continue to receive the best possible overall customer service.”

Level Two – Interested:

Stakeholder workshops

6.23 We have held 20 stakeholder workshops since 2010 in relation to our RIIO-ED1 Business Plan.

6.24 The events focussed in detail on various aspects of our business that stakeholders had indicated were important to them. The events allowed WPD to identify stakeholder priorities and suggestions for improvements to services and processes. We were able to test and refine our proposals, identify areas for further consultation and, where required by stakeholders, provide additional detail.



6.25 The events have attracted 650 stakeholders representing a broad cross-section of customer groups. Stakeholders included large customers, suppliers, manufacturers, local authorities, emergency planners, environmental groups, vulnerable customer representatives, parish councils, health trusts and universities. Each table featured an average of 8 stakeholders, all from a different stakeholder interest groups, which allowed for fair and balanced discussions from a wide range of perspectives.

6.26 Sessions were held in urban and rural locations across WPD’s regions to ensure a representative view. Events were held in Nottingham, Birmingham, Cheltenham, Gloucester, Exeter, Cardiff and Bristol.

6.27 All round-table discussions were run by independent facilitators to stimulate conversation and to ensure workshop reports were independent and unbiased.

6.28 All tables included a senior manager from WPD to provide context and to answer stakeholder questions.

- 6.29 The full-day sessions involved presentations from WPD to give an overview of the company and our activities and to provide important context to the topics for discussion, including current WPD performance and a detailed explanation of our future plans.
- 6.30 Stakeholders then participated in facilitated, qualitative round-table discussions followed by quantitative electronic voting, to give stakeholders an instant overview of the consensus amongst those in attendance. In the afternoon there were optional sessions where stakeholders could discuss topics of specific interest with a relevant “expert” from WPD who is operationally responsible for that service area.

Level Three – No prior knowledge:

‘Power for life’ media awareness campaign

- 6.31 Stakeholder feedback, in particular from vulnerable customers, students and young people, is that raising awareness of WPD should be a high priority.
- 6.32 We therefore run a month long ‘Power for life’ awareness campaign every year where we send a newsletter to every customer and run a series of television adverts.
- 6.33 The purpose of the campaign is to:
 - raise awareness of who we are and what we do;
 - report on our current performance and what we are doing to improve our service;
 - invite customers to have an input in our stakeholder engagement programme and help shape our future investment plans.

6.34 WPD’s fourth annual awareness campaign began in February 2013 with the unveiling of a brand new television advert - a bold and novel approach to engagement with millions of customers who have little knowledge of WPD.



6.35 The month-long campaign, could be viewed on all ITV regions serving our operational area, as well as on S4C in Wales and the ‘On Demand’ services for ITV and Channel 4. The advert and a range of other information about the campaign are also featured on the WPD website.

6.36 In addition, a four-page information leaflet was delivered to every home and business (7.8 million) in our region, whilst advertising appeared in every regional daily and evening newspaper and included contact information for people wishing to get in touch.

6.37 The ‘Power for life’ newsletter included an overview of our stakeholder engagement programme, our plans for RIIO-ED1 and an invitation for customers to participate in our consultation process.

6.38 This ensured that customers with little or no prior knowledge of WPD were given the opportunity to understand our business and have their say on our future plans. In 2012, respondents to our media campaign



took part in our 'willingness to pay' research, one month later. Several have also attended Business Plan workshops.

- 6.39 Over 2,000 customers from 20 major towns and cities across our region took part in face-to-face opinion research, pre and post campaign. This was designed to gauge awareness levels, preferences about what information they would like to receive from us and their preferred method of receiving it.
- 6.40 Following the 2013 campaign there was a considerable increase in awareness of WPD – 56% amongst those who recalled the campaign – compared with 28% of those who could not.
- 6.41 Customers also endorsed the methods used by WPD, by highlighting newsletters, TV and radio, and the WPD website as their preferred methods of receiving information from us.

Level Four – Future:

Future customers workshops

- 6.42 Given that WPD's Business Plan covers the period up to 2023, we have identified a new stakeholder segment for specific consultation. In 2013 we ran a series of workshops with university students to give future electricity bill payers the opportunity to influence and feedback on our plans.

- 6.43 The sessions at Nottingham University and Bristol University were attended by a number of interested students.

- 6.44 Every effort was made to engage with as broad a range of students as possible. At Nottingham University, we used the university's own database of 209 societies and sent invitations by email. At Bristol University, we placed a number of posters at locations around the Students' Union building and also emailed students directly, using a specialist student marketing company.



- 6.45 Following an introductory presentation from WPD, we held facilitated, qualitative round-table discussions about WPD's future plans with respect to:

- reducing power cuts;
- customer communication methods and the use of social media;
- climate change mitigation and protecting the network from severe weather;
- smart networks and low carbon technology.

Key findings

- 6.46 WPD has carried out an extensive programme of stakeholder engagement, seeking feedback on a range of different options for future service and network investments. The following provides a high level summary of the key findings.

Network reliability

86% of stakeholders agreed with WPD's draft plans and outputs to improve network performance.

91% agreed with WPD's draft plans and outputs to enhance network resilience to severe weather.

- 6.47 **Network reliability is the number one priority for our stakeholders:** Stakeholders are not willing to see any deterioration in service.
- 6.48 **Network reliability during normal weather conditions:** Stakeholders would like to see, as a minimum, a 10% reduction in power cut frequency and duration.
- 6.49 **Network reliability for worst served customers:** Stakeholders support Ofgem's decision to change the definition from 15 power cuts in 3 years (lasting 3 minutes or more), to 12 power cuts in 3 years. They would like to see the number of worst served customers reduced by 20%, from 20,000 to 16,000 customers. When WPD proposed to go further (improve by 40%) stakeholders told us to scale-back our plans to, what they felt was, a more reasonable cost per benefitting customer.
- 6.50 **Network resilience to severe weather and flooding:** The importance of this topic has increased significantly over the last 18 months, and is now viewed as one of WPD's top three priorities. Most stakeholders would like to see the initial resilience tree cutting programme accelerated to be completed in a total of 20 years. They would also like to see our flood mitigation measures extended to protect more substations from flooding.

Environment

82% of stakeholders agreed with WPD's draft plans and outputs to reduce the environmental impact of the network.

74% agreed with WPD's draft plans and outputs to facilitate increased volumes of Low Carbon Technologies (LCTs).

- 6.51 **Reducing oil and gas leaks from equipment:** Minimising WPD's environmental impact by reducing oil and SF₆ gas leaks from equipment is seen as a key issue by stakeholders, although it is viewed as a 'medium' priority when placed in context with other priorities for investment. Stakeholders would like to see continued incremental improvements, but do not support significantly increased investment.
- 6.52 **Improving visual amenity:** Undergrounding overhead lines in National Parks and Areas of Outstanding Natural Beauty remains a priority area but this is a polarising issue for many stakeholders and our proposals have received a mixed response. Stakeholders have told us they would like to see an increase on the current rate of undergrounding schemes (5km per year, 40km in 8 years) but did not support the initial proposal to significantly increase the amount (to 70km in 8 years), which was rejected by 64% of stakeholders.

- 6.53 Low carbon technologies:** Future-proofing the network is a high priority, but stakeholders are very conscious of the uncertainty surrounding the timing and uptake of low carbon technologies. They would like WPD to strike a balance in RIIO-ED1; increasing investment where there is confidence the need exists, but not to go too far ahead of need.
- 6.54** A number of stakeholders were of the view that WPD's initial low carbon technology projections were too high, particularly regarding the uptake of electric vehicles and heat pumps. As a result, we have undertaken a detailed forecasting exercise with the Centre for Sustainable Energy (CSE) to ensure that our 'best view' scenario is evidenced and can be supported.
- 6.55** 'Demand Side Management' (DSM) is the term used to describe the ability of a DNO to switch off or reduce a customer's electricity consumption when overall demand on the network is high. To allow this to happen a DNO will have had to reach agreement with the customer beforehand. In return for this the customer will be in receipt of lower electricity unit charges or could be rewarded with a set payment. This agreement allows a DNO to avoid the additional costs of reinforcing its electricity network for situations where the peak load on the network occurs infrequently and/or is of short duration. Whilst stakeholders can see a role for some application of DSM, the majority felt that this would be restricted to commercial/industrial customers in the foreseeable future. Also this is not seen as a long term solution as businesses may move or change and agreements will need to be renegotiated.

Connections

86% of stakeholders agreed with WPD's draft plans and outputs to make the connections service faster and more efficient.

94% agreed with WPD's draft plans and outputs to improve communications during the connections process.

- 6.56** Stakeholders are very clear that this is an area where we can still do better, despite WPD having the highest satisfaction rating in the industry for our connections service. Stakeholders believe we should shorten the overall time it takes to provide a quotation, and once the quotation is accepted, the time it takes for the connection to be completed.
- 6.57** Customers would also like us to make the process easier by providing more frequent, timely communication and alternative methods by which they can access information. For example, stakeholders overwhelmingly supported the introduction of an online self-service system for enquiries, applications, payments and progress tracking.

Customer satisfaction

96% of stakeholders agreed with WPD's draft plans and outputs relating to customer service and complaints.

94% agreed with WPD's draft plans and outputs relating to customer communication.

- 6.58** Stakeholders recognise that WPD currently has the highest overall customer satisfaction of any DNO group and support continuing the existing ways of monitoring customer satisfaction.
- 6.59** Stakeholders have told us that the telephone remains their preferred method of communication during a power cut and that having accurate, useful and up-to-date information is key. However, stakeholders would also like a choice of communication methods to use, such as social media and real-time power cut information on our website. Acting on this feedback we have already introduced real time online power cut information.

Social obligations

- 6.60** Stakeholders believe that WPD has a key responsibility to continue to support vulnerable people, by providing practical support during power cuts and proactive preparation advice and information in advance of an interruption. Stakeholders strongly supported expanding our current support services and increasing the amount of information provided to customers.
- 6.61** Stakeholders state that we must take ownership for maintaining and ensuring the quality of data on our Priority Services Register and liaise with partner agencies to keep this up to date.
- 6.62** Stakeholders believe there is a role for WPD in tackling wider social issues such as fuel poverty and WPD are uniquely placed to support customers due to the interaction we have with them and also the fact that we do not directly bill customers. However, they state that we must not duplicate the responsibilities of other agencies, or deviate too far from our core responsibility to support people during power cuts.

7 Incentives

- 7.1 Incentives are a fundamental element of the RIIO regulatory framework. They are used to drive innovation and the delivery of outputs, rewarding DNOs that do well but also applying penalties for poor service. Incentive measures and monitoring of appropriate outputs is an important part of ensuring that the services that customers receive are delivered at an appropriate cost.
- 7.2 For a financial incentive to apply there needs to be:
- clarity of the output being incentivised;
 - confidence in the data being used to assess the output;
 - evidence that the output is important to customers;
 - assurance that the output is not covered by other incentives or other obligations.
- 7.3 The following describes the incentives that we and our stakeholders believe should be active in the RIIO-ED1 period.

Interruptions Incentive Scheme (IIS)

- 7.4 Keeping the lights on is at the top of stakeholders requirements. IIS rewards outperformance (and penalises underperformance) against targets for the number of interruptions and the duration of those interruptions. Since its introduction, IIS has resulted in improvements to network performance and WPD's resource management, business processes and network investment have enabled WPD to outperform the targets.

Broad Measure of Customer Satisfaction (BMCS)

- 7.5 The BMCS quantifies customer views on the service level we provide and rewards outperformance. It incorporates general customer satisfaction, how complaints are resolved and the effectiveness of stakeholder engagement. Excellent customer service is a key WPD business objective and this incentive provides the opportunity for WPD to be rewarded for providing industry leading customer service. WPD is the best performing DNO group under BMCS.

Network Innovation Competition/Network Innovation Allowance (NIC/NIA)

- 7.6 Ofgem has proposed replacing the current Low Carbon Network Fund and Innovation Funding Incentive with the Network Innovation Competition and Network Innovation Allowance. Stakeholder feedback has highlighted the importance of innovation and preparation for a low carbon economy. This incentive allows innovation trials to be undertaken in preparation for larger scale rollouts as the use of the network changes.

Guaranteed Standards of Performance (GSOPs)

- 7.7 There are a range of GSOPs covering the provision of connections, supply interruptions and response to problems such as voltage complaints. They represent minimum levels of service and therefore where failures occur, customers are entitled to standard payments, set by Ofgem. WPD targets zero failures against the standards, and is the best performing DNO group under this incentive. However should a failure occur during RIIO-ED1, WPD will voluntarily double the value of each payment.

Time to Connect Incentive

- 7.8** Connection customers suggest that the time taken for a new connection is an important aspect of good customer service for them. The time to connect incentive combines the time to provide a quotation and, once the offer is accepted, the time to complete the works. Improving the overall time taken will provide customers with a better service.

Incentive on Connections Engagement (ICE)

- 7.9** Major connection customers have a requirement for more detailed interactions with DNOs. ICE will support the development of engagement strategies that will improve the information provided and service delivered. Delivery against these strategies will be assessed by Ofgem and where engagement is inadequate a penalty will be applied.

Information Quality Incentive (IQI)

- 7.10** The IQI drives DNOs to provide realistic cost forecasts for investment requirements and shares the benefit of underspending or penalty of overspending against those forecasts with customers. WPD has the best record of any DNO group for both forecasting accurately and for delivering the work promised. What the IQI incentive means is that where WPD can find more efficient ways of delivering work, there is a financial reward for the efficiency saving. Such savings also benefit customers as a proportion of the savings are returned to customers through lower DUoS charges.

Environmental incentives

- 7.11** Whilst the measurement of electrical losses is difficult, it is important that we continue to seek ways to reduce losses on the network. Ofgem will assess our actions during the RIIO-ED1 period and a discretionary reward is available. In addition, we will continue to report our business carbon footprint, which will be published in Ofgem's Electricity Distribution Annual Report.

8 Innovation

- 8.1 WPD has invested to develop more innovative ways of working and this has helped make us the best DNO for operational performance. We have improved efficiency in all areas of our work at least in part by making innovation part of our business as usual.

Our approach to innovation

- 8.2 The purpose of the development of new technology, techniques and working practices is to respond to customer needs, reduce the investment required in the network and improve customer service levels.
- 8.3 Our key goals of safety, network reliability, customer service, business efficiency, cost effectiveness and carbon reduction underpin the strategy for innovation.
- 8.4 We identify and test new ideas and when they are proven we adapt them as necessary to be deployed as “business as usual” solutions.
- 8.5 We deliver innovation through a small team of our own specialist staff that implement their work using our networks teams. The reporting arrangements for the innovation team set them within the core of the company’s Policy department where they interact with the specifiers and technical experts. This close relationship allows ideas for innovation projects to be developed quickly into workable solutions.

Innovation to date

Customer service and commercial innovation

- 8.6 Customer service and commercial innovation improves business efficiency and the way we interact with our customers and other stakeholders. WPD has developed and adopted a significant number of innovative ideas including:
- working in partnership with RVS, British Red Cross and other organisations that can assist vulnerable customers;
 - using ‘ENMAC Mobile’ that allows field staff to provide real-time job-status updates from hand held devices. These devices integrate real time with our customer service systems allowing our contact centre staff to have up to date information to pass on to our customers. The data is also used to automatically update our messaging provided to callers who do not wish to talk in person to a call taker;
 - carrying out fuel poverty work with Warm Front and National Energy Action;
 - establishing a broad Customer Panel that meets with the CEO every three months;
 - self-quotation packs for simple service alterations allowing customers to quickly estimate an approximate cost and make informed decision about whether to make a formal request. Two benefits are derived: for the customer it provides a very quick process for obtaining an estimate to allow informed decisions; for WPD it reduces the volume of speculative requests for quotations and drives greater efficiency;
 - calling customers back to keep them updated about supply interruptions and check that they are back on supply;
 - introducing out-bound text messaging providing information about outages and restoration times for customers;
 - providing empathy training for contact centre staff to improve their listening skills and know-how to deal with people suffering difficulty;
 - ‘ramping up’ contact centre – we have trained general office staff specifically in the use of contact centre call taking systems. In the event of bad weather or storms we are able to increase the number of call takers significantly. This enables us to deal with high volumes during the periods of very bad weather but an efficient contact centre number during normal day to day work-loads;

- enabling staff to take calls from home by deploying contact centre systems in home locations. In addition to training general office staff to carry out contact centre activities, we also ensure that the levels of service can be maintained if staff are prevented from travelling to the office due to the severe weather or for business continuity (e.g. flu pandemic).

Technical and operational innovation

8.7 Our track record of network performance and cost efficiency has been built on our ability to find new ways of doing things. Some examples include using:

- mobile devices to control and manage high voltage switching operations. (We are the first DNO to do so). By using a hand held device innovatively we have reduced the volume of voice traffic to our control centres and increased productivity within our field teams. The handheld devices are in continuous communication with ENMAC, which means our operational status and customer messaging remain up to date in real time;
- technology from the gas industry to develop cable fault location equipment that detects the gas produced when a cable fails rather than only using the electrical characteristic of the cable. The new technology identifies the position of the fault more quickly, without the need for more specialist electrical testing. The accuracy of the method reduces the size and number of excavations required when repairing faults and reduces the inconvenience to customers;
- early innovation funding to complete the 'Registered Power Zone' (RPZ1) project. This project investigated the possibility of applying dynamic line ratings on the 132kV system. By using wind speed and temperature sensors the rating of the line can be calculated continuously. This allows additional load to be carried on a given conductor over and above its traditional rating where conditions allow - such as on cool windy days;
- network automation that quickly reconfigures networks when faults occur to allow as many customers as possible to have power restored before the fault is found and fixed.
- helicopter mounted thermal imaging for the detection of hot spots on overhead lines and in substations that shows where faults are likely to occur;
- mobile switchboards and high voltage generation for faster restoration of faulty equipment and quicker restoration of customer supplies;
- 'hot glove' techniques that allow certain overhead activities to be done live at 11kV reducing the need to turn off supplies to customers;
- our own fire engines to quickly deal with the pumping out of flooded sites;
- our in-house apprentice scheme, moving away from NVQ to reduce bureaucracy and allowing the quicker training of apprentices.

Environmental innovation

- 8.8 We have established effective environment processes that have been assessed against ISO 14001.
- 8.9 We have undertaken a number of innovation and other projects which have a direct impact on the environment such as:
- completing the 'Registered Power Zone' (RPZ1) project which investigated the possibility of applying dynamic line ratings on the 132kV system and applying the results in policy. The major benefit being that we can allow more LCTs to connect quickly and avoid significant reinforcement costs that would have applied under a traditional approach;
 - the trialling of electric Transit vans and other small electric vehicles;
 - refurbishing buildings to the highest BREEAM standards;
 - using PFT tagging of fluid filled cables - this adds a special tracer element to the oil that can then be detected from above the ground, speeding up leak location and reducing the volume of oil lost into the environment.

Historic and current DPCR5 innovation funding within the UK

- 8.10 During DPCR4 (2005 to 2010) Ofgem set up the Innovation Funding Incentive. Its purpose was to improve the quality of research and development within the UK electricity industry.
- 8.11 During DPCR5, Ofgem introduced the Low Carbon Networks Fund (LCNF). This fund is designed to support the development of low carbon technologies and facilitate the changes required by the Government's Carbon Plan. In the RIIO-ED1 period the 'Network Innovation Allowance' and 'Network Innovation Competition' will replace the current funding schemes.
- 8.12 The Engineering and Physical Sciences Research Council and the Technology Strategy Board support innovation and we have already worked with them on various projects.
- 8.13 Within the Ofgem Low Carbon Networks Fund we are the most successful DNO group. Of the 16 larger projects awarded up to 2012 (Tier 2), WPD is running 5 (31%). Of the 31 smaller (Tier 1) projects, WPD is running 11 (35%).

Future plans for innovation funding

- 8.14 We will request a Network Innovation Allowance of 0.5% of total regulated revenue, approximately £55m throughout the period. We will also work with partners to provide innovative proposals for larger projects to be funded through the Network Innovation Competition. Together these projects will lead to investment of over £130m in innovation.

Drivers for innovation in RIIO-ED1 and beyond

- 8.15 We are striving to deliver ever higher levels of customer service whilst simultaneously improving the overall efficiency of our operations.
- 8.16 Innovation has always been a part of all areas of WPD's operations and we are now using our expertise to adapt the network to meet the needs of the Government's Carbon Plan.
- 8.17 The Carbon Plan includes scenarios which show the effect of the introduction of new technologies to reduce carbon emissions.

- 8.18 The Smart Grid Forum has refined the DECC scenarios to produce their report “Assessing the Impact of Low Carbon Technologies on Great Britain’s Power Distribution Networks”. This report sets out the areas of interest for the development of smart solutions which we are addressing in LCNF and Innovation Funding Initiative (IFI) projects.
- 8.19 The Carbon Plan and the smart meter roll out will change the way customers use the network. We cannot plan in isolation. We will use regular stakeholder engagement to make sure that our plans are consistent with our customers’ changing needs.
- 8.20 The existing network is designed and built to serve one way power flows from centralised generation to end customers. The growth in distributed generation on the network is causing a move away from this and we will need to develop systems that can manage a variety of sources of generation and also allow for two way flows of power.
- 8.21 If large volumes of LCTs connect to the networks it will increase electricity demand and change the way networks are operated. There is uncertainty about where and how new technologies will be deployed and so we need to be able to react flexibly to how customers and generators need networks to operate.
- 8.22 In future, network design and operation will include elements of automatic network control and reconfiguration, flexible approaches to loading and capacity, local storage of energy, demand side management of overall load and flexible meshed networks.

Preparations for the future

- 8.23 The number and technical specification of new forms of generation and demand will become more certain over time. It is likely that certain products, like domestic DSR, will not be commonplace until the smart meter programme is completed in 2020. Electric vehicle usage will also increase as new widely affordable models become available and customers replace their petrol or diesel cars. Changes in Government incentives may alter the rate of take up or may introduce new applications.
- 8.24 During the development of these LCTs we will continue to deliver electricity to customers by constructing new network and reinforcing existing assets in response to known load increases and forecasts.
- 8.25 Where appropriate we will use simple solutions to reduce future costs e.g. installing devices that avoid the costs of having to change the assets again in the future when load changes.
- 8.26 Innovative preparations in the current review period include specifying low voltage distribution cabinets with higher class current transformers (CTs) fitted. These CTs provide greater accuracy and will allow us to be ready to monitor load if required. The additional cost of fitting the higher class CTs is very low (1.4% of the total cost of the cabinet) and, as at 2012, we are the only DNO making this preparation.
- 8.27 In a similar way, we specify that all of our 11kV distribution switchgear is pre-wired ready for remote actuators to be fitted. These actuators allow the switchgear to be operated from a remote location allowing us to increase or decrease load on parts of the network immediately in response to changing demands. Whilst the cost of actuators is high the cost of including pre-wiring is low (1.5% of the total cost).
- 8.28 Both of these initiatives have the added benefit of allowing us to return later to fit automation and monitoring equipment without having the need to interrupt customers or replace assets again.
- 8.29 Using socio-economic customer profiles data provided by the Centre for Sustainable Energy (CSE) we will identify areas on our network where the take up and clustering of LCTs is likely to create a load related problem on the network in the future.

- 8.30 Present information from the CSE shows that there is a forecast high uptake of LCTs on specific circuits that make up approximately 7% of our network.
- 8.31 This information will be incorporated within WPD planning systems allowing these LCT forecasts to be considered within the business when either customer driven load or generation requests have been received or when WPD asset replacement work is planned. This will enable informed decisions to be made with respect to the size of the replacement assets.
- 8.32 Where a high density of LCT connections is forecast there will be an opportunity to increase transformer or cable capacity whilst carrying out asset replacement. We estimate that this opportunity will occur at 95 sites and on 75km of cable. The additional costs are £0.11m and £0.3m per year respectively.
- 8.33 Taking the opportunity to oversize assets for a small incremental cost avoids the need to change transformers or lay bigger cables at a later date. This will save the future costs of £1m per year of changing transformers again and £5m per year on laying additional cable for a second time.
- 8.34 This targeted approach, where there is a high confidence of LCT clustering, will ensure that we only install larger capacity assets ahead of need where there is a strong likelihood that the higher capacity asset will be required in the future.

Identifying and delivering solutions from LCNF projects

- 8.35 To ensure that we learn as much as possible from each of the innovation projects we have assigned specific individuals as points of contact for the other DNOs and their suite of projects. These staff will make sure that we capture and apply learning from other DNOs and assimilate it, with our own learning, into business as usual.
- 8.36 The suite of LCNF Tier 2 projects will provide an excellent source of learning to help develop future networks and applications. The timescales of these projects mean that the majority of the learning and outcomes will be provided in the next few years and into the RIIO-ED1 period.

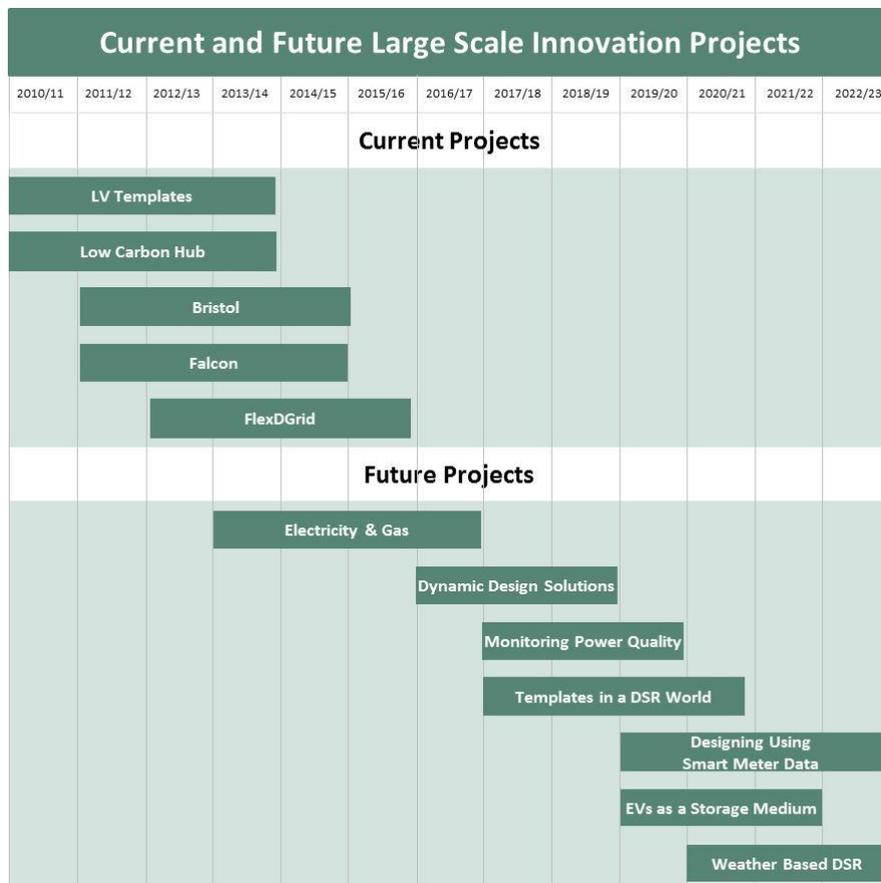
Rolling out the learning from innovation projects

- 8.37 We deliver innovation through an in-sourced model with a small team of specialists using the resources of our operational teams to deliver tools or products onto the network. The innovation team is part of the company's Policy department where they interact with equipment specifiers and technical experts of the wider business. Whilst the team is in-sourced, it provides the link to expertise outside of the company or industry.
- 8.38 Once trials are successfully completed, the outputs are taken forward and replicated across our network.
- 8.39 We monitor all the LCNF projects as they develop and make use of learning and outcomes as they are reported. An example of learning that we have used can be seen in our Tier 1 Community Energy Action project where we are using smart commercial agreements from UKPN's Flexible Plug and Play project rather than developing our own agreements.
- 8.40 Our RPZ1 project has developed a practical application for Dynamic Line Ratings (DLR) on our 132kV overhead lines. The project results have been embedded into business as usual and are documented in a dynamic line rating policy. On the circuit where the dynamic solution was developed, we have identified 19MVA of capacity that can be offered using DLR. This is a 20% increase on the static capacity values. Similar values will be achieved on circuits which are operated in a dynamic way.

Sharing our results

- 8.41 WPD has links with a wide range of universities and businesses, both in the UK and across the world. When we choose partners we look to find an organisation that has a unique capability for the work or project being undertaken. Some projects include technology that is not from within the electricity industry and in these cases partners who would not be obvious matches can provide us the best resource.
- 8.42 To maximise the effect of research and innovation we participate in industry wide groups, such as those developed with EA Technology. In everything we do it is important that we learn from others and do not waste time or resources duplicating effort on topics which are consistent across the industry.
- 8.43 A key feature of the LCNF is the requirement for us, in common with all other DNOs, to share our learning on the projects we are completing. The main annual event for knowledge sharing is the LCNF conference which we actively support. We were pleased to be able to host the very successful 2012 event in Cardiff.
- 8.44 Within each of our Tier 2 projects there is a requirement for individual knowledge sharing which is achieved by specific knowledge dissemination events. We have hosted events for individual projects and for our whole portfolio of projects. Often the most important thing that we can share from our projects is data and results. We have two dedicated websites where interested parties can find out information on our projects. The www.westernpowerinnovation.co.uk site gives details of all our projects and the results they are producing. The www.lowcarbonuk.com site is aimed more at the research community and provides more details of the data and results seen on the projects.

Our large scale innovation projects



Our current innovation projects

LV Templates

- 8.45** The electricity network was designed to carry power from large, centralised power stations and major grid infeed points to distant load centres in town and villages. Historic load profiling data for network design used this basic operating model.
- 8.46** The shift to distributed low carbon generation such as from wind or solar sources has already moved a significant amount of generation closer to the customer load. At the same time homes are being made more energy efficient through better insulation. These changes require an overhaul of the basic planning assumptions that have been used when assessing power flows and energy consumption.
- 8.47** The LV Templates project was used to evaluate how low voltage (LV) electricity networks can best accommodate the low carbon future.
- 8.48** In 2011, 951 substation sites in South Wales were fitted with data monitors and communication equipment. The project also required voltage monitors to be fitted at the ends of the LV circuits that are fed from these substations. This required over 3,500 monitors to be installed to collect the data and send it remotely back to WPD.
- 8.49** The project monitored energy usage and used statistical clustering techniques to identify more accurate patterns in electricity consumption. This allowed us to develop new planning assumptions and embed them in templates that can be used to facilitate more accurate network planning.
- 8.50** This project completed in 2013 and has shown that low voltage solar generation normally generates onto the network at around 80% of its rating. We are now altering our design assumptions to reflect this, which will increase the volume of PV generation which can be accepted onto the network.
- 8.51** We have also shown that voltage rise effects from PV are less than expected. Both these results will be used within the business and will influence national design policies and solar generation acceptance criteria.
- 8.52** We have already published network templates data making it available for all DNOs to use in planning LV network solutions. The final project reports in the autumn of 2013 provide full template data and conclusions.
- 8.53** We will use the results from the LV Templates project to change the way we design networks. We are initially implementing a templates based planning approach in South Wales that will make relevant changes to network planning tools. Once successful we will roll this out to our other licence areas.
- 8.54** The templates will allow us to better predict the effect of low voltage generation and load and ultimately enable us to accept more on to our existing network. We will also incorporate the learning from SSE's 'Thames Valley Vision' project in our implementation. Furthermore we will use more detailed weather and climate simulations to improve our understanding and adjust the templates accordingly. Scottish Power's (SP) 'Flexible Networks for Low Carbon Future' project will also provide additional knowledge on the acceptance of low voltage generation and the design of flexible ratings.
- 8.55** Although the project is formally closed we are continuing to collect data and process it under business as usual. This will allow us to identify demand profile changes as customers adopt LCTs and we will re-model the templates accordingly. The data collection and network monitoring infrastructure will also be used to support new innovation projects without the need to recreate a monitored network.

8.56 We have also published a discussion paper on the possibility of harmonising statutory voltage limits with those in the rest of the EU. The paper has been presented to industry groups including DECC, the Welsh Assembly Government and Ofgem. The consequences and benefits have also been debated at the ENA and with National Grid. We are now progressing the design of controlled trials within the South Wales area. Findings of several Electricity North West (ENW) projects will also help determine next steps.

Lincolnshire Low Carbon Hub

8.57 The Lincolnshire Low Carbon Hub has been designed to test a variety of new and innovative techniques for integrating additional low carbon generation onto electricity networks with limited capacity. The aim is to avoid the costs that would normally be associated with more conventional reinforcement.

8.58 We will offer Dynamic Line Rating solutions and Flexible Generation Capacity Agreements on this project. Both of these will improve the utilisation of our assets. The cost of connections and time to connect for generation customers will also reduce as a result of these initiatives.

8.59 The Lincolnshire Low Carbon Hub project will demonstrate how we can dynamically operate a network to accommodate additional generation. The project will make use of dynamic line ratings and voltage optimisation to alter the network running arrangements at 33kV. Electricity North West's (ENW's) 'Capacity to Customers' project will consult on changes to P2/6, and we expect their learning to also increase connected generation. We will develop the systems to achieve this using learning from our project and the ENW project. Both projects will be complete by the end of 2015 and we plan to deploy the solution to 11 identified sites between 2015 and 2018.

Project FALCON

8.60 Project FALCON is a £16m project focused on providing an understanding of the dynamic nature of utilisation of the 11kV network. FALCON aims to facilitate the installation of low carbon technologies by delivering faster and cheaper connections on the 11kV network.

8.61 It will be used to assess a number of alternative solutions to conventional network reinforcement. The project will develop modeling tools that use real-time data to inform network planning decisions, rather than traditional indicators such as total demand and generic engineering guidelines.

8.62 The FALCON telecommunications solution, based on mesh radio, will become our preferred standard for primary substation to distribution substation communications. It will be developed during RIIO-ED1 and will eventually replace the legacy analogue based systems.

8.63 The uptake of demand side response within the FALCON project is set to exceed the 9MW target. This will be achieved through a mix of bilateral contracts and services provided through aggregators. Uniquely, the service is being offered as complementary to the National Grid STOR service, meaning that customers can engage with us and National Grid at different times. We are currently working with the other DNOs and National Grid on a common framework.

8.64 The outcomes from the FALCON project will produce an energy modelling simulator that will be used to design and operate the network in a more efficient way. UKPN's 'Flexible Plug and Play' project will also deliver tools to design and operate to allow cheaper and quicker generator connections, and we will incorporate these tools in our design templates.

8.65 The network management functionality trialled in FALCON will be implemented into ENMAC, and the prototype system decommissioned. The new functionality will become available to implement across WPD networks from 2015, leading to the widespread rollout of load balancing automation schemes as loads grow with the increase in adoption of LCTs.

BRISTOL

- 8.66** The BRISTOL project aims to provide an innovative approach to operating networks utilising battery storage in a customer's premises. The battery will store output from PV generation and utilise it in many ways. A DC network for lighting and USB type charging, an inverter controlled by the customer and WPD, and new tariffs will help manage the PV generation locally.
- 8.67** The project will seek to address issues associated with the large-scale deployment of PV generation. The technologies will be implemented in ten schools, one office and thirty homes, all connected to 13 distribution substations.
- 8.68** The project is testing the coordination of a local micro-grid but has also provided an excellent storage and DC power test bed. The BRISTOL solution will not immediately be ready for rollout by DNOs; probably requiring further refinement and standardisation as a proportion of the installation is beyond the customer's meter. We are developing this work with Siemens, in association with Northern Powergrid.

FlexDGrid

- 8.69** The connection of generation to urban HV networks can lead to fault levels that exceed the design capability of existing networks. Traditionally higher capacity assets would need to be installed to enable the generation to connect.
- 8.70** The FlexDGrid project is based in Birmingham and seeks to explore the potential benefits from three complimentary methods:
- enhanced fault level assessment;
 - real-time management of fault level;
 - fault level mitigation technologies.
- 8.71** Recent forecasts by National Grid and the Energy Technologies Institute (ETI) point toward an increase in the use of combined heat and power (CHP) in urban areas. This increase in distributed generation will lead to higher fault levels in most of the larger cities in the WPD area during the latter part of RIIO-ED1.
- 8.72** Even though this project is less than 12 months old, it is already providing data which may change how we calculate fault level and allow us to accept more local generation and CHP onto our network. As this assessment work completes and reports, it will be used to alter design principles.

Our future plans for innovation projects

- 8.73** We have identified the areas we will explore and develop through the Network Innovation Competition up to the end of RIIO-ED1. Many are still at a conceptual stage and build upon anticipated learning from existing projects. The scope of each project will become clearer as current learning in WPD and other DNOs is revealed.
- 8.74** The 'Electricity and Gas' project was developed as our Tier 2 proposal for 2013. It was to investigate the use of hydrogen as a storage medium. There are parts of the network where there is more generation output than can be accommodated by the network. This means that the output of the generation has to be constrained, limiting the low carbon benefits of the generation capacity. Reinforcement of the network often requires the replacement of EHV or 132kV network at high cost.
- 8.75** This project sought to use the excess generation output to produce hydrogen which can either be used as fuel to produce electricity when the output from generation is lower or it can be injected as a source of additional gas into the local gas network. The project was not selected for funding in the 2013 LCNF competition. Discussions are now underway to review alternative approaches at a smaller scale and to identify an appropriate funding source for this cross energy sector project.
- 8.76** Our current methods of designing the network generally assume that the network will operate in a passive way. Our 'Dynamic Design Solutions' project will review and create new design solutions to be included in the standard options available to planners. This project will investigate how the existing planning design tools need to change and implement those changes.
- 8.77** The increased range of power electronics and distributed generation that we will see on our network is likely to have a detrimental effect on power quality. The 'Monitoring Power Quality' project will investigate ways of monitoring power quality to ensure that we understand their impact and develop techniques to continue to operate the network within power quality requirements.
- 8.78** 'Templates in a DSR World' will build upon the existing LV Templates work. The project will refine the planning assumptions to accommodate the various combinations of demand side response and management that we will begin to see on our networks.
- 8.79** Through our 'Designing Using Smart Meter Data' project we will investigate how this data can be used to model, design and manage our network more effectively. We already plan to provide a geographically based dataset and this project will help develop the detail for that.
- 8.80** More electric vehicles are also likely to be used in the latter years of RIIO-ED1. 'EV as a Storage Medium' will investigate how electric vehicles can be used for energy storage when there is excess generation and used to release the stored energy at times of peak demand to smooth load profiles and potentially defer network reinforcement.
- 8.81** By the end of the RIIO-ED1 period we expect demand side response and management to be a key part of our network management processes. With this in place, additional weather data and forecasting tools will allow us to more proactively deploy DSR/DSM to smooth load profiles in response to weather conditions and our 'Weather Based DSR' project will develop appropriate design solutions to a variety of constraints.

Our plans for RIIO-ED2 and beyond

- 8.82** Future improvements to the communications network will bring additional benefits in the way that we can use LCTs to manage a more flexible electricity network by the beginning of RIIO-ED2. The bandwidth and reliability of communications will increase and the cost of bandwidth is expected to fall. Greater levels of network control from better communications will enable more specific and targeted management of the network.
- 8.83** By the end of RIIO-ED2 a significant number of the domestic LCTs installed during RIIO-ED1 will be coming to the end of their useful lives. Future generations of these technologies will provide additional services for customers and by working with manufacturers we will encourage the development of features that will also enhance our ability to manage the network.

9 Outputs

- 9.1 Outputs are what we deliver through our investment programmes, network management decisions and customer service initiatives.
- 9.2 Stakeholder engagement has refined the outputs WPD will deliver for the eight years of RIIO-ED1.
- 9.3 Outputs have been defined in each of the six categories of the regulatory RIIO-ED1 framework and their main objectives are described below:
- **Safety** – minimise the safety risks associated with operating the network;
 - **Reliability** – maintain a reliable supply of electricity through a more resilient network;
 - **Environment** – reduce WPD’s own impact on the environment and facilitate lower carbon technology;
 - **Connections** – provide an excellent service for customers connecting to the network;
 - **Customer satisfaction** – provide excellent customer service;
 - **Social obligations** – meet the needs of vulnerable customers.
- 9.4 The following sections provide a summary of the outputs that will be delivered.

Outputs – Safety

- 9.5 Safety is at the heart of everything we do and we will continue to target improvements in our overall safety performance.
- 9.6 The objective of safety outputs is to minimise the safety risks to people. During RIIO-ED1, we will deliver the following outputs:

Compliance with health and safety law

- Target zero improvement notices, prohibition notices and prosecutions from the Health and Safety Executive;
- Complete work programmes to achieve compliance with ESQCR statutory clearance to structures or the ground;
- Complete inspection and maintenance programmes every year.

Reducing accidents

- Reduce our overall accident frequency rate by 10%;
- Maintain our active participation in the ENA SHE 'Powering Improvement' initiatives that lead to improved safety performance;
- Work with our trade unions to enhance safety performance including the provision for additional 'Behavioural Safety' initiatives;
- Investigate all accidents involving members of the public, contractors or our own staff to ensure that learning points are quickly understood and communicated.

Substation security and theft of equipment

- Enhance security measures at higher risk substations sites to reduce the number of repeat break-ins.

Educating the public

- Organise and run over 1,000 school days to provide safety information to over 400,000 school children;
- Continue to publish literature on maintaining safety around electricity apparatus and send approximately 500,000 copies of this literature to targeted landowners, businesses or leisure operators.

Compliance with health and safety law

- 9.7 The Government seeks to promote the right safety behaviour of organisations and people through an extensive range of health and safety law. The Health and Safety Executive (HSE) has the responsibility of enforcing health and safety legislation and its inspectors work with the industry to prevent incidents.
- 9.8 We have created a strong safety culture throughout WPD and procedures will continue to be refined to improve upon the existing safety performance to minimise the need for intervention by the HSE.
- 9.9 We will ensure that assets are regularly inspected and maintained, in line with good asset management practice, carrying out appropriate remedial actions. In addition we will complete the work programmes to provide sufficient clearance between overhead lines and structures, and height above the ground.
- 9.10 We will work cooperatively with the HSE to ensure our practices and policies continue to be compliant with health and safety legislation but also to seek out and apply best practice in the management of safety.

Reducing accidents

- 9.11 Whilst the electricity distribution network and work upon it has many inherent hazards, the design standards, operational processes, working methods and bespoke training adopted by WPD minimise the risk of injury to staff, contractors and the public.
- 9.12 We will seek to reduce the overall accident frequency rate involving our own staff by 10%. This will be achieved by working with staff, trade unions and the industry to understand the causes of accidents.
- 9.13 Whilst incidents or accidents involving members of the public are rare when they do occur WPD will continue to quickly investigate the causes and ensure any appropriate action is undertaken without delay.
- 9.14 We will continue to work with Trade Unions and their appointed safety representatives within the business to ensure that industry best practices are shared and applied within WPD. We will look to further enhance the safety of our staff through additional training in the understanding of behavioural safety.

Substation security and theft of equipment

- 9.15 Increases in the value of metal have led to high levels of theft from the network. Long range forecasts suggest metal prices will remain high throughout RIIO-ED1. In addition to the potential for electricity supplies to be interrupted, intruders to substations often leave sites in a hazardous state potentially exposing members of the public to increased risks.
- 9.16 WPD has been proactive working with police forces to assist in crime prevention. We have provided guidance to improve the identification of recovered stolen materials. Furthermore we have facilitated meetings with neighbouring forces to ensure that intelligence is shared across police area boundaries.
- 9.17 Enhanced substation security measures will be installed at higher risk sites and incidents will continue to be investigated to minimise criminal acts against WPD.

Educating the public

- 9.18 School children are not always aware of the potential dangers of electricity or the electricity network. During RIIO-ED1 we will provide education sessions to 400,000 school children about the potential dangers of electricity via our on-going programme of school visits. These visits provide an opportunity to make children aware of the dangers, helping them to recognise overhead lines and substations and explaining what they should avoid doing near to electricity distribution equipment.
- 9.19 Similarly, people engaged in work or taking part in recreational activities near network assets are usually focussed on what they are doing and can be unaware of the potential hazards around them. We will continue our practice of targeted mailshots of our safety literature. During RIIO-ED1 we will send out approximately 500,000 copies to specific landowners, businesses or leisure activity providers whose activities could be higher risk if undertaken near to our equipment.

WPD will educate 400,000 school children about electrical safety and send out 500,000 safety books to targeted landowners, businesses or leisure operators to enhance their understanding.

Stakeholder views

- 9.20** WPD maintains regular contact with the HSE and is subject to periodic inspections. These interactions serve to identify areas where improvements can be made. WPD will respond to all observations to ensure that necessary corrective actions are taken.
- 9.21** Other stakeholders regard safety as a 'given' requirement and therefore it remains a high priority for the way that work is carried out and how WPD interacts with customers, landowners and other parties.

Outputs – Reliability and availability

9.22 The objectives of our network reliability and availability outputs are to deliver improvements in our performance so that our customers have fewer and shorter power cuts.

Network performance

- Improve network performance by the end of RIIO-ED1 so that on average customers will have 16% fewer power cuts and have their electricity supplies restored 23% quicker.
- Ensure that a minimum of 85% of customers have their power restored within an hour on HV faults.

Guaranteed Standards of Performance

- Reduce by 20% the number of customers experiencing a power cut lasting 12 hours or more.
- Target zero failures on all other GSOPs.

Worst served customers

- Reduce by 20% the number of customers classified as worst served.

Enhancing network resilience

- Apply flood defences to 75 substations, reducing the risk of both damage to equipment and power cuts due to flooding.
- Accelerate the programme of tree clearance for resilience by 40% with the objective to deliver the programme five years earlier than suggested by Government guidelines, clearing 700km of overhead line per annum.
- Enhance substation battery life to be resilient for 72 hours in the event of major power losses.

Network performance

9.23 Customers expect power to be available all the time with many household activities and business processes relying on electricity. As a low carbon future becomes reality there will be a greater requirement and reliance on electricity as a source of energy. This will mean that reliability and availability become even more important.

9.24 Since 2002, Ofgem has incentivised distribution companies to improve network performance through the Interruptions Incentive Scheme (IIS) where rewards are available for outperformance and penalties applied where targets are not met. IIS measures the average number of interruptions per 100 customers and the average length of time in minutes each customer is without power (it excludes power cuts that are under three minutes).

9.25 The measures can be subdivided into three main controllable factors:

- fault rate – the number of faults that occur;
- customers interrupted per fault – the average number of customers that go off supply when a fault occurs;
- duration of a fault – the average length of time it takes to restore supplies.

9.26 The number of faults is influenced by a range of activities (described under RIIO-ED1 as 'secondary deliverables'). During RIIO-ED1, we will:

- replace the assets where the assessment of condition and the assessment of consequence of failure creates the highest overall risk;
- reinforce the network using both smart and traditional solutions to provide enough network capacity to prevent assets overloading and failing;
- remove defective poles from the network within one year of being assessed as defective so as to prevent in-service failures (particularly during high winds, snow or icy conditions);

- complete 100% of the tree clearance programmes to reduce the likelihood of branches and windborne debris affecting overhead lines;
- complete maintenance programmes to ensure equipment will last for its expected life.

9.27 We will install more network protection and automatic network switching devices to reduce the number of customers affected by power cuts.

9.28 The duration of interruptions will be minimised through a clear business focus on restoring supplies quickly using technology, the effective deployment of resources and the installation of mobile generation.

9.29 As a result of these actions we will improve network performance for unplanned interruptions so that customers are on average interrupted for no more than 38 minutes (a reduction of 23%) and experience no more than 6 interruptions in ten years (a reduction of 16%). (Both reductions are set against the 2011/12 numbers verified by Ofgem).

On average, WPD customers will have their power restored 23% faster

Guaranteed Standards of Performance (GSOPs)

9.30 The Electricity (Standards of Performance) Regulations 2010 define the standards that companies are required to meet and the level of payments to customers for failures.

9.31 WPD is the best performing company for GSOPs.

9.32 The most significant change to the standards, for RIIO-ED1 will require a payment to customers when they have been off supply for more than 12 hours. This reduces the timescale from 18 hours, which has been in place since the standards were implemented.

9.33 This change will require DNOs to respond even more quickly to power cuts. WPD has already introduced internal key performance indicators (KPIs) as a result of the proposal in Ofgem's initial consultation document for RIIO-ED1. These KPIs will allow the business to develop the correct 'mind-set' and work towards meeting the new requirements by the start of RIIO-ED1. WPD proposes to reduce by 20% on average the number of customers experiencing interruptions lasting 12 hours or more when compared to DPCR5.

WPD will ensure that 20% fewer customers suffer long power cuts

9.34 WPD will continue to aim to never fail the other standards covering the following areas:

- response to failure of a fuse (EGS1);
- multiple interruptions (EGS2A);
- supply restoration during events affecting more than 5,000 customers (EGS2B);
- supplies affected by rota disconnections (EGS2C);
- supply restoration during severe weather (EGS11).

9.35 Whilst the payments for failures are defined in the regulations, WPD proposes to voluntarily double the amount paid to customers as a demonstration of commitment to them.

WPD will voluntarily double the value of payments made for Guaranteed Standard failures

Worst served customers

- 9.36** Ofgem defines worst served customers as those that regularly experience 12 or more higher voltage interruptions over a three year period. Often these customers are connected to remote parts of the network that are predominantly overhead.
- 9.37** In DPCR5, Ofgem introduced a new way of funding whereby a DNO could recover costs for improving service to worst served customers provided they could demonstrate that performance improvements had been achieved. The cost recovery was capped at £1,000 per customer.
- 9.38** WPD recognises the inconvenience of frequent power cuts and has invested to make improvements for worst served customers. Further improvements will be made during RIIO-ED1 to reduce the number of worst served customers by 20%.

WPD will reduce the number of worst served customers by 20%

Enhancing network resilience

- 9.39** Severe storms can cause network faults and lead to interruptions in supply for large numbers of customers. Restoring supplies can take a long time when resources are dealing with multiple incidents or complex issues.
- 9.40** In particular strong winds can lead to overhead lines being damaged by trees. Following storms in 2002 new legislation was introduced that requires DNOs to clear trees from lines to a resilient standard that prevents damage should a tree be blown over. The rate of resilience tree clearance will be accelerated by 40% to complete the programme five years earlier than had been planned in DPCR5.
- 9.41** Flooding can affect substations causing supplies to be interrupted to a wide area. The risk can be reduced by erecting temporary barriers in response to floods, constructing permanent barrier walls around the perimeter of sites or critical equipment, or installing equipment higher up on structures. We will protect an additional 75 sites that are at risk of flooding.
- 9.42** A number of 'blackouts' around the world have increased the concern about widespread interruptions, resulting from coincidence of events on the electricity system causing a 'cascade' of disconnections. Whilst the likelihood of such an event is low, we will ensure that battery systems for communication and operation of the equipment can last 72 hours; the length of time it is expected it will take to recover from a widespread interruption.

Stakeholder views

- 9.43** Stakeholders have provided a very strong view that they do not want network performance to deteriorate; keeping the lights on should remain the number one priority.
- 9.44** Initial stakeholder engagement, indicating that improvements are expected, was reinforced during Business Plan discussions where two thirds of stakeholders stated that reducing the number and average duration of power cuts should be a high priority. Over half agreed with WPD's proposals to reduce average frequency and duration of power cuts and a further 30% wanted even greater reductions.
- 9.45** Stakeholders have strongly requested a reduction in the duration of power cuts and therefore WPD will make further improvements to fault management processes and increase the use of mobile generation.
- 9.46** Stakeholders recognise that living in remote areas makes power cuts more likely and they support investment where it improves performance for customers receiving the poorest performance.
- 9.47** A number of high profile floods during 2012 made stakeholders more aware of the disturbance flooding can cause and therefore flood defences are becoming increasingly important to them.
- 9.48** Tree clearance to reduce the impact of storms was also supported by stakeholders, with half endorsing WPD's existing programme and over 40% wanting acceleration of the programme.

Outputs – Environment

- 9.49 Outputs for the environment can be subdivided into two broad categories: those that help increase the amount of low carbon technology connected to our network and those that reduce WPD’s environmental impact. Each category is considered separately below.

Helping to increase the volumes of low carbon technologies (LCTs)

- 9.50 LCT related outputs are to facilitate the connection of low carbon generation and provide network capacity to accommodate the increased use of low carbon technologies. During RIIO-ED1 we will:

Facilitate increased volumes of low carbon technologies (LCTs)

- Improve the time to provide a response to customers wanting to use LCTs by 20%.
- Identify LCT hotspots using data from smart meters, expert organisations and local authorities and use this to inform decision making.
- Selectively carry out asset replacement using larger sized assets.
- Reduce costs for future customers by developing smart solutions to provide alternative and innovative techniques for network management.
- Provide additional network capacity through utilising traditional methods or smart intervention.

- 9.51 The Government has committed to undertake positive action on climate change by reducing the emission of greenhouse gasses.

- 9.52 For DNOs the major impact is in respect of the increasing number of LCTs used for electricity generation, transportation and heating for buildings. Part of WPD’s role is to enable cost effective and timely connection of distributed generation (such as solar panels) and to provide sufficient capacity in the network to accommodate the increased loads from electric vehicle charging and heat pump domestic heating systems.

Provide a faster response to customers

- 9.53 The volume of LCTs connecting to the network is expected to grow significantly. We will improve the processing of requests during RIIO-ED1 to ensure a 20% reduction in response time. As current volumes are low we propose to establish a benchmark based upon the response provided in the last year of DPCR5.

Identification of LCT hotspots

- 9.54 DECC has published forecasts for the scale of uptake of LCTs that will require the distribution networks to increase capacity and be more operationally agile in order to deal with fluctuations in generation and demand.

- 9.55 We have used socio-economic information to predict where LCTs may connect and have then analysed the consequential impact on the network. During RIIO-ED1 we will continue to use expert organisations, information from local councils and data from smart meters to build up a better view of areas that become LCT hotspots i.e. those areas with a high probability of requiring additional capacity in the near future. We will develop a clear link to WPD network planning tools to ensure that the information is readily available for team planners dealing with future customer load enquiries.

Asset replacement using larger assets in LCT hotspots

- 9.56** When assets reach the end of their useful lives they are normally replaced on a like-for-like basis. In areas identified as LCT hotspots, it may be prudent to install larger capacity transformers to provide adequate capacity for load growth, especially where there is high confidence that the load will increase. This will provide a lower overall cost of running the network as it will avoid the need to reinforce assets again. We will use the information about LCT hotspots to selectively install larger assets during asset replacement work.

Development of smart solutions

- 9.57** Where demand increases do not coincide with assets reaching the end of their useful lives alternatives to the traditional approaches to reinforcing the network by installing larger capacity assets can be more appropriate and more cost effective. Smarter ways of operating the network and providing capacity are being researched, trialled and tested. WPD's existing extensive innovation programme will continue into RIIO-ED1 and new techniques will be adopted to become 'business as usual'.

WPD will develop smart solutions for providing network capacity

Network reinforcement using smart solutions

- 9.58** Future network development will incorporate both traditional and smart network reinforcement approaches. The solution used will be dependent upon the rate of load growth and the local circumstances. It will be chosen to ensure that adequate network capacity is provided to deal with LCT hotspots whilst minimising costs for future customers are minimised.
- 9.59** Dynamic Line Ratings for EHV overhead lines will be developed into WPD policy to apply across the whole business. This will result in more flexible arrangements with customers allowing the quicker connection of load or generation without the need for more traditional reinforcement – lowering costs and reducing the time to connect. This will mark the innovation's full implementation to become 'business as usual' in RIIO-ED1.
- 9.60** Analysis of real time customer load from our 'LV Templates' project will be applied to our planning and design tools. This will ensure that the understanding and knowledge from the project is actually applied as a business tool to improve the ability to connect LCTs.
- 9.61** Apply the knowledge gained from the Lincolnshire 33kV low carbon hub project across the whole business. This will allow us to control load flows on the 33kV network in conjunction with new commercial arrangements with generators and large customers avoiding the need for network reinforcement.

Stakeholder views

- 9.62** Whilst some stakeholders are sceptical about the scale of adoption of electric vehicles and heat pump heating systems, they acknowledge that significant changes can arise in a short period of time as has been illustrated by the rapid uptake of domestic solar panels.
- 9.63** Provided sufficient incentives are available, stakeholders generally believe that there will be an increase in LCTs which will have an impact on the networks and WPD will need to respond by accommodating these in a cost effective manner.

Reducing the overall impact of WPD operations on the environment

9.64 The second area of WPD's Environmental Outputs has the objective to reduce the impact of the WPD business operations on the environment by reducing greenhouse gas emissions, limiting pollution, improving waste management and improving visual amenity.

9.65 During RIIO-ED1 WPD will:

Reduce technical network losses

- Install larger sized transformers when replacing assets at highly loaded locations.
- Use larger sized cables when installing new network in LCT hotspots.

Reduce the carbon footprint of the business

- Ensure all replacement vehicles have lower CO₂ emissions than those they are replacing.
- Ensure all new or substantially refurbished buildings meet, as a minimum, the 'excellent' standard under the Building Research Establishment Environmental Assessment Method (BREEAM).
- Reduce the amount of residual waste sent to landfill by 20% over the first two years of RIIO-ED1 and 5% per annum thereafter.
- Reduce the carbon footprint of the business by 5%.

Reduce the environmental risk of leaks from equipment

- Reduce by 75% the volume of oil lost through leaks from oil filled cables.
- Reduce by 17% the volume of SF₆ gas that is lost from switchgear.
- Install effective oil containment 'bunds' around plant containing high volumes of oil.

Improve visual amenity in National Parks and Areas of Outstanding Natural Beauty (AONBs)

- Underground 55km of overhead lines in National Parks and AONBs.

Reduce technical network losses

9.66 When assets reach the end of their useful lives they are normally replaced on a like-for-like basis. We will utilise additional information from our innovation projects and the new data to be provided following the installation of smart meters to identify heavily loaded distribution sites.

9.67 At these sites it may be appropriate to install larger transformers or an alternative cable size and we will consider the electrical losses on our equipment before deciding on the most appropriate replacement.

Reduce the carbon footprint of the business

9.68 Our business can also have an adverse impact on the environment and, as a minimum, we ensure that it meets legal obligations. Wherever possible we aim to exceed those requirements and seek to adopt best practice where legal requirements do not exist.

9.69 The network is spread over an area of 55,500km² and consequently we need to operate a significant fleet of vehicles to allow our staff to serve this territory effectively. When our vehicles reach the end of their useful lives they are replaced with modern vehicles. We always ensure that the opportunity is taken to replace them with more fuel efficient engines. Having already trialled electric commercial vehicles for some time, the use of electric vehicles will also be considered where they are available and can be deployed effectively. The cumulative effect of this fleet replacement is a progressive reduction in carbon and gas emissions.

9.70 In addition, we will provide driver training to staff to teach them how to adopt driving techniques that will reduce fuel consumption with the consequent lowering of carbon emissions and noxious exhaust gases.

- 9.71 WPD operates from 59 offices and non-operation sites that vary in age and construction. There are opportunities to refurbish some buildings and improve their energy efficiency. When building refurbishment takes place it will be carried out to the 'excellent' standard under the Building Research Establishment Environmental Assessment Method (BREEAM) to reduce energy consumption where appropriate and effective to do so.
- 9.72 WPD's business activities create waste. Many of the items can be recycled and therefore WPD has, for a number of years, segregated waste to limit the amount being sent to landfill. During RIIO-ED1 further efforts will be made to reduce the amount of residual waste being sent to landfill by 20% over the first two years and 5% per annum thereafter.

Reducing the environmental risk of leaks from equipment

- 9.73 Older types of higher voltage cables (33kV and above) contain oil based fluids to assist in the insulation and cooling of the cables. During RIIO-ED1 the cables with the highest leak rates, caused by poor condition, will be replaced. In addition, a chemical tracer tagging system will be applied to all cables with a history of leaks to speed up the location of leaks. Together this will reduce the volume of oil escaping and affecting the environment by 75%.
- 9.74 SF₆ gas is used throughout the industry as an insulating medium in switchgear. Whilst it provides many benefits, it is a potent greenhouse gas. Since there are no current alternatives to SF₆, WPD will target the replacement of 1% of switchgear with highest leak rates to reduce the volume of SF₆ lost by 17%. We will also continue to engage with organisations that are looking to replace SF₆.
- 9.75 Large transformers and some items of switchgear contain large volumes of oil posing a risk of contamination should a leak arise. Containment walls or 'bunds' can be constructed around the equipment to prevent oil leaking into the environment. During RIIO-ED1 all 33kV transformers and above and any bulk storage sites (in excess of 1,500 litres) will have an effective bund. This will require both new bunds to be established and for the refurbishment of existing bunds that are in poor condition.

Improving visual amenity

- 9.76 There are a number of National Parks and AONBs across the WPD geographical footprint containing iconic sites where the removal of WPD overhead lines would improve the visual amenity for both locals and tourists. During RIIO-ED1 WPD will continue to underground overhead lines, working with the National Parks and AONBs representatives to determine the lines that provide greatest amenity benefit.

**WPD will underground
55km of overhead lines
in National Parks and
AONBs**

Stakeholder views

- 9.77 The engagement process provided stakeholders with the opportunity to influence a range of different environmental activities.
- 9.78 Stakeholders were presented with different options for the replacement of leaking oil filled cables and SF₆ insulated switchgear. Whilst there was a spread of preferences, the majority favoured the removal of the worst 1% as this gave a balance between addressing the assets with the highest leak rates and value for money.
- 9.79 Proposals to underground overhead lines in National Parks and AONBs received a mixed response with initial engagement stages placing a high priority on increasing this activity. During further consultation on the Business Plan an alternative view was proposed that less should be done. 60% of stakeholders stated this should not be a high priority.

Outputs – Connections

- 9.80** Customers who require a new electricity supply need to obtain a new connection to the network. This includes all demand connections (customers who use electricity), generation connections (customers who generate electricity and may need to export it into the network) and unmetered connections (customers with equipment that does not have its own meter - such as street lighting) that are covered by the Guaranteed Standards of Performance.
- 9.81** The objective of connections outputs is to provide an excellent service for customers connecting to the network whilst facilitating competition in the connections market. During RIIO-ED1 we will:

Provide a faster and more efficient connections service

- Improve the overall time to deliver a connection by 20%.
- Provide excellent customer service so that customers rank WPD as the top performing DNO group in customer satisfaction surveys.
- Conduct surveys with distributed generation customers to gauge their satisfaction and identify improvements to the service provided.

Improve communication with customers

- Develop and enhance online connections processing and progress tracking.
- Ensure information provided in documentation and online is effective.

Enhance engagement with major connections customers

- Work with major customers to identify where processes can be improved and quickly implement changes.
- Host quarterly 'surgeries' for connection customers to better understand processes.

Guaranteed Standards of Performance (GSOPs)

- Target zero failures of the connection GSOPs.

Facilitation of competitive market

- Improve customer awareness of third party connection providers and carry out regular checks with customers that they understand the options available to them.
- Work with third party connection providers to extend the scope of contestable work to HV and reinforcement work.

Provide a faster and more efficient connections service

- 9.82** The overall time to deliver a connection is a combination of the time to provide a quotation (the time to quote) and, once the offer is accepted, the time taken to construct the connection. We will assess and refine our processes, incorporating feedback from customers, to improve the overall time by 20%. Whilst the Ofgem decision document states that the new overall time to deliver a connection will only apply to certain categories of connection (small developments of typically 1-4 properties), WPD will apply this measure across all market segments.
- 9.83** Customer satisfaction is important and we will improve interactions with customers so that customers rank WPD as the top performing DNO group. We will extend the surveys to distributed generation (DG) customers so that we can monitor the performance and ensure we deliver high levels of customer satisfaction.

Improve communication with customers

- 9.84 Customers seeking a connection require clear information on their options, the process for connection and what they need to do. This information is provided in leaflets, online via our website, by customers making telephone contact with contact centre staff or by direct contact with locally based planners. The amount of information required by customers differs depending on the complexity of the connection and the knowledge of the customer. It can range from simplified process explanations to provision of detailed network parameters.
- 9.85 The information provided in leaflets and online will be regularly reviewed and updated to ensure it reflects improvements to business processes and incorporates feedback from customers.
- 9.86 Some customers have indicated they prefer to carry out transactions and track progress online. The scope of online tracking will be enhanced and new facilities provided in response to customer feedback.
- 9.87 Where necessary, planners will visit customers on site to discuss requirements in more detail.

Enhance engagement with major connection customers

- 9.88 Major connection customers (generally large developers, DG customers and multiple site developers) have a wide range of requirements for their connections and the connection arrangements can be complicated. Whilst generic information is available, these customers usually require additional details and a more interactive communications process.
- 9.89 WPD will carry out dedicated engagement with these customers to understand where improvements can be made to information provision, communication processes and work delivery interaction.
- 9.90 We also propose to extend the use of local 'surgeries' where connection customers can attend events hosted at local offices to learn about the connections process, discuss issues and meet the WPD staff they interact with. We will do this ahead of the start of RIIO-ED1.
- 9.91 To keep major connections customers informed, we will publish an agreed plan of action and any changes resulting from the engagement.

WPD will improve processes as a result of dedicated engagement with major customers

Guaranteed Standards of Performance

- 9.92 The final proposals for DPCR5 introduced new standards to establish minimum levels of service and the level of compensation to customers where these are not met.
- 9.93 WPD targets zero failures against all the standards, but in the event of a failure will voluntarily double the value of payments to customers. This acts a strong incentive for the business to provide the necessary level of service.

Facilitation of competitive market

- 9.94** Providing choice for customers drives companies to improve service and become more efficient.
- 9.95** Prior to the introduction of competition for the provision of connections, customers could only request a connection from the incumbent DNO. Customers now have the choice of two alternatives: Independent Connection Providers (who construct the network and pass on ownership of that network to WPD) or Independent Distribution Network Operators (who construct the network and retain ownership and operation of that network). We will continue to promote competition and identify opportunities to inform customers that they have this choice and an annual survey will be used to gauge the level of customer awareness.
- 9.96** Whilst third parties can provide new connections, they cannot carry out all aspects of connections work. WPD has been actively assisting competition, developing new processes and systems to allow third parties to extend the scope of what they can do. We anticipate that this will soon include interconnection to, and reinforcement of, the existing HV network. Further extension will be considered in response to the requests from third party connection providers.
- 9.97** We will ensure that all improvements made to connections processes and timescales apply equally to the service provided to third party connection providers.

Stakeholder views

- 9.98** Whilst many customers are happy with the service that WPD provides and we currently have the highest satisfaction in the industry for our connections service, customers have also given us clear feedback that this is an area where we can still do better. In particular, some customers perceive the overall process to be slow and communication sometimes difficult. Initial stakeholder engagement supported this view with stakeholders asking for the process to be made quicker and clearer, and placing a high priority on these improvements.
- 9.99** When options were presented to stakeholders to improve or maintain our performance with respect to the overall time to connect, connections customers were in favour of improvements; 43% of business customers and 40% of developers/connections customers wanted improvements. The option to improve by 20% gained most support amongst these customers with a direct experience of applying for a connection, although there was little support to see costs increase to the customer for doing so. Other general stakeholders were firmly of the view that any possible cost increases should be borne by the connection customers only.
- 9.100** Whilst many connection stakeholders would like improvements to the overall time it takes to connect, this is not always the most critical requirement. Some major customers stress that the important aspect is to have a timely connection where work is coordinated with the development. This requires good communication and co-operation between the developers and WPD.
- 9.101** Stakeholders were also consulted on how communication should be improved. They overwhelmingly supported the introduction of a web based self-service system to make enquiries, submit applications, process payments and track the progress of projects online. Stakeholders dismissed the provision of a single local point of contact, suggesting that it would introduce an additional person in the chain, delaying communication between the customer and the appropriate WPD contact. They also showed little support for the introduction of a dedicated contact number for more knowledgeable first contact, preferring to be put through to the local team that would be doing the work.

Outputs – Customer satisfaction

9.103 The provision of excellent customer service for WPD's 7.8 million customers is a core business objective. During RIIO-ED1, we will:

Customer service

- Continue to be the number one performing DNO group across all elements of the Broad Measure of Customer Satisfaction.
- Maintain certification to the Customer Service Excellence standard.

Telephone response

- Respond to telephone calls quickly, answering them within 2 seconds.
- Ensure abandoned calls are less than 1%.
- Always provide customers with the option to talk to a WPD call taker.

Communication with customers

- Provide a restoration time for every outage.
- Call back all customers who have been in contact about a fault.
- Contact customers within two days of receiving a non-fault enquiry.
- Provide on demand messaging via text and social media for customers who want be kept informed by means other than the telephone.
- Develop 'self-service' options for customers to find information online.

Stakeholder engagement

- Continue to host a Customer Panel where the CEO will meet with WPD's expert stakeholders four times a year.
- Continue to host an annual round of 6 stakeholder workshops.
- Continue to produce a stakeholder report every year providing an update of actions taken as a result of stakeholder engagement.

Complaints

- Resolve at least 70% of complaints within one day.
- Continue to have a target of zero complaints where the Ombudsman has to get involved.

Guaranteed Standards of Performance (GSOPs) awareness

- Continue to send the 'Power for Life' publication to all 7.8 million customers which will include promotion of the GSOPs.

Customer service

9.104 WPD consistently achieves excellent levels of customer service that are reflected across all elements of the Broad Measure of Customer Satisfaction. During RIIO-ED1, we will continue to refine and improve the processes and practices for customer service to maintain industry leading performance.

WPD will continue to be the No1 DNO group for customer service

9.105 The Customer Service Excellence standard is a Government scheme which recognises organisations that provide effective and excellent customer service. WPD has been accredited to the standard since 1992 (when it was known as the Charter Mark) and we will continue to assess the service provided against this standard.

Telephone response

- 9.106** Allowing customers to speak to someone is an essential part of good customer service and we are proud of the telephone response that we already provide.
- 9.107** We will continue to operate highly efficient Contact Centres using the latest technology to provide automated messaging for power loss in addition to well trained staff to talk to customers who wish to speak to us in person. We will answer calls within two seconds and have the lowest number of abandoned calls.

Communication with customers

- 9.108** When supplies are interrupted, customers welcome good information about when they will be back on supply. WPD will provide a restoration time for every outage, using progress updates from field staff to provide best estimates.
- 9.109** All customers contacting WPD about a fault will receive a call back to provide progress updates or check that supplies are restored and gain feedback on the service provided. This will provide useful information for further service improvements.
- 9.110** Customers asking for action from us will be contacted by a local team member within two days of receiving the request.
- 9.111** Some customers want to be kept informed about what is happening on the network. We will provide messaging via text and social media to send information to customers who have asked to be kept informed. We will also enhance the 'self-service' capability of the WPD website to allow customers searching for network outage information to find it quickly and in an easy to use format.

Stakeholder engagement

- 9.112** Regular stakeholder engagement is used to improve day-to-day operations and inform business priorities. WPD has over 4,500 active stakeholder contacts, categorised into customer segments, allowing targeted engagement on specific issues. Engagement occurs throughout the business but there are specific events dedicated to stakeholder engagement.
- 9.113** Every quarter, WPD's CEO meets with an expert Customer Panel to shape our thinking and future priorities. In addition, there are at least six stakeholder workshops held every year where key themes and investment priorities are tested and discussed with a wider audience.
- 9.114** These events provide very useful feedback and will continue during RIIO-ED1.

**WPD's CEO to meet
Customer Panel
four times a year**

Complaints

- 9.115** Whilst WPD endeavours to get things right first time, sometimes things can go wrong. When complaints are received they are treated with urgency and with an aim to resolve the matter to the customer's satisfaction quickly. Local team managers are responsible for dealing with complaints, visiting customers where necessary to understand what can be done to put things right.
- 9.116** WPD will resolve at least 70% of complaints within one day and ensure that the response provided to all complaints result in the lowest number (across the industry) being investigated by the Ombudsman.

GSOPs awareness

- 9.117** GSOPs provide a means for individual customers to receive compensation payments when performance fails to meet the standards. They cover the provision of connections, supply interruptions and response to problems such as voltage complaints. WPD performs well across all categories and the number of failures is very low.
- 9.118** In the event of a failure WPD will voluntarily double the value of payments to customers. This will act a strong incentive for the business to provide the necessary level of service.
- 9.119** Every year, we will publicise the GSOPs in WPD's 'Power for Life' publication that is posted to all 7.8 million customers.

Stakeholder views

- 9.120** Traditionally customers have either written or called on the telephone, but advances in technology mean that there are more direct communication methods available online; via e-mail, text or social media. Part of the stakeholder engagement was used to explore which additional communication methods should be utilised in RIIO-ED1. Stakeholders suggested that many organisations, including local authorities, are using alternative technology and that multi-media communications should be available. They also stressed that this should be implemented quickly and at no extra cost to customers. WPD has therefore responded and will implement a number of changes during DPCR5 including the introduction of two way texting, online data systems and the use of social media.
- 9.121** Stakeholders have informed WPD that they believe that the values of Guaranteed Standard payments are too low to cover the impact of the failures. The payments were never intended to cover consequential loss and this position remains unchanged. However, since customers find that they have been inconvenienced when failures occur, WPD proposes to voluntarily double the value of the payments made.

Outputs – Social obligations

9.123 The objective of WPD’s social obligation outputs is to improve the accuracy of information held about vulnerable customers and improve the services provided through partnership working. During RIIO-ED1, we will deliver the following social obligation related outputs:

Improving understanding of vulnerability

- Work with expert partners to improve understanding of the needs of vulnerable customers.
- Train staff to recognise the signs of vulnerability.

Improve the data held on the Priority Services Register

- Proactively contact vulnerable customers at least once every two years to check the details on the Priority Service Register.
- Improve the quality of Priority Services Register data by working with other agencies and sharing information.
- Co-ordinate meetings with suppliers to agree criteria for vulnerability.

Improve the services provided for vulnerable customers

- Raise awareness of the Priority Service Register.
- Make 10,000 crisis packs available.
- Contact all medically dependent customers every three hours during power cuts.
- Continue to provide practical support via the Royal Voluntary Service (RVS) and British Red Cross.
- Seek feedback from vulnerable customers to improve service.
- Develop mechanisms for sharing information with local resilience forums.

Address fuel poverty by supporting customers to access key information

- Build a database of regional agencies we can refer customers to for assistance.
- Work with partners to develop links to/from WPD’s website.
- Develop joint information, awareness campaigns and co-ordinated assistance with partners.
- Provide bespoke training to WPD front line staff.
- Use data analysis to help identify localities with high concentration of vulnerable households.
- Develop local outreach services.

WPD’s Vulnerable Customer Strategy

9.124 Since 2005 WPD’s partnership approach to vulnerable customers has been recognised as best practice by Ofgem’s Customer Service Reward and the Government’s Customer Service Excellence accreditation.

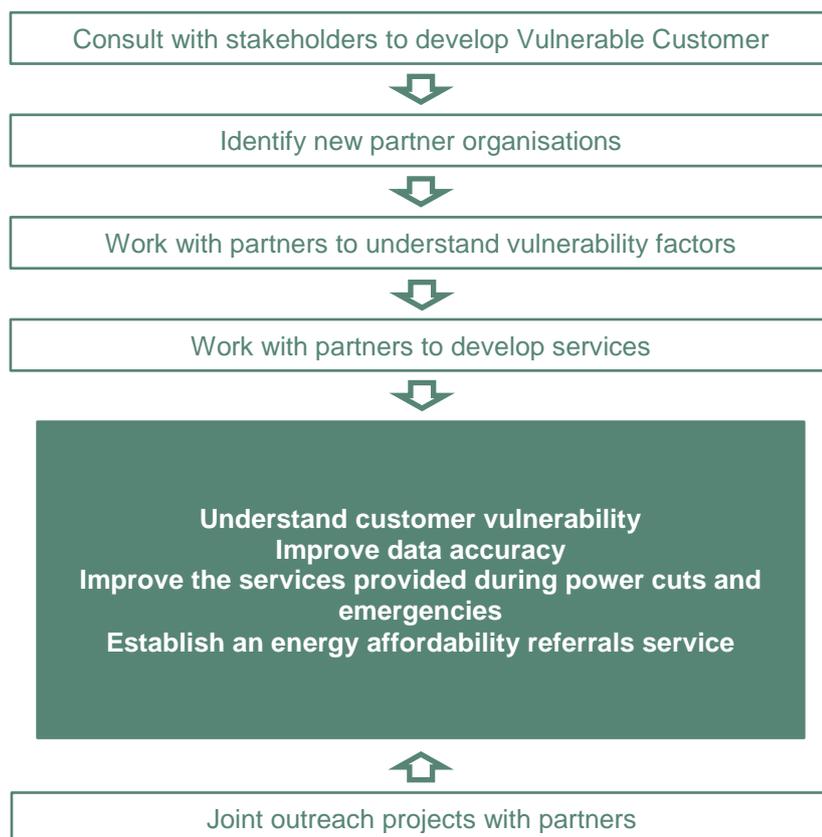
9.125 During this time, WPD’s approach to service provision has been focused on customers on the Priority Services Register (PSR) who are registered as being dependent on electricity due to age, disability or chronic illness.

9.126 Going forward, WPD will focus on social obligations in relation to a broader group of customers who are defined as vulnerable for a range of reasons, including energy affordability. In order to respond to the needs of these customers, WPD has consulted stakeholders on new approaches to vulnerability.

9.127 Our Vulnerable Customer Strategy will achieve the following objectives;

- understand the nature of vulnerability and customer need;
- improve the accuracy of our records with respect to vulnerable customers;
- improve the services provided to vulnerable customers during power cuts and emergencies;
- refer customers to partners that can assist with energy affordability matters.

9.128 The following diagram shows the main elements of the WPD Vulnerable Customer Strategy:



Improving understanding of vulnerability

9.129 WPD will adopt the British Standard on Inclusive Service Provision (BS 18477:2010) to provide a framework for developing our understanding of vulnerable customers. This standard states: *“Consumer vulnerability is relative and dynamic, and a consumer’s needs and abilities can change with time or circumstance”*.

9.130 We will build a network of partners who can provide an insight into our understanding of vulnerability factors to help us to determine the needs of these customers and work with us on new initiatives.

9.131 It is important that appropriate staff are trained to recognise vulnerable customers so that they can provide the appropriate services.

9.132 We will work with partners to develop bespoke communication and listening skills training for front line Contact Centre staff to enable them to identify key warning signs of vulnerability. This will include recognising signs of disability, illness, age and fuel poverty.

Improve the data held on the Priority Services Register

9.133 WPD maintains a Priority Services Register (PSR) that records details about vulnerable customers so that additional support can be provided when the customers contact WPD or when their supply is interrupted. Approximately 715,000 customers are on the PSR across our four licenced areas which equates to almost 10% of our customer base. Over 165,000 customers are registered for medical dependency on power or for special communication needs.

- 9.134 Customers are added to the PSR mainly via data flows from suppliers. WPD will coordinate meetings with suppliers to agree criteria for vulnerability so that customers are treated appropriately.
- 9.135 Circumstances can change and therefore the details held on the PSR can become out of date. The main opportunity to check the accuracy of existing records is presently during a power cut and since these can be infrequent, inaccuracies in the PSR can result over time.
- 9.136 WPD will establish a dedicated team of people to proactively contact customers and check the details we hold about them. This is a process that will be repeated every two years to ensure that the register remains up-to-date and we can give the right support when required. This will be supplemented by sharing data with other service centred organisations that hold information about vulnerable customers, provided customers give their consent and data protection allows.

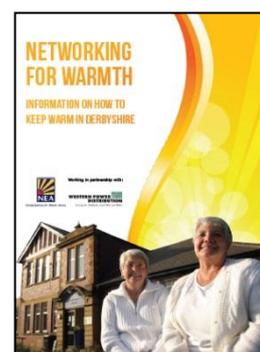
WPD will contact vulnerable customers every two years

Improve the services provided for vulnerable customers

- 9.137 Links have been established with many organisations such as the RVS and British Red Cross to improve the understanding of the needs of vulnerable customers. These partners work with WPD to improve the services that are provided and we will continue to work with them during RIIO-ED1.
- 9.138 Help will be provided for vulnerable customers during power cuts and where possible advice will be provided to enable them to be prepared should a power cut occur.
- 9.139 In addition, 10,000 ‘crisis packs’ containing a blanket, torch and other useful items will be made available to agencies and WPD staff to hand out to vulnerable customers during power cuts.
- 9.140 We will build on existing relationships with local resilience forums to share information on support for vulnerable customers when extreme events, such as widespread flooding, occur.

Address fuel poverty by supporting customers to access key information

- 9.141 Some customers on low incomes cannot afford to use electricity to effectively heat their properties. There is growing concern that customers will suffer as economic growth remains low and austerity measures affect fuel poor customers further. Whilst WPD does not have a direct obligation to provide energy efficiency advice we are already working with the charity National Energy Action (NEA) to provide information on the causes of and solutions for fuel poverty.



- 9.142 We will seek to establish more partnerships to build a referral framework and provide links to websites and information.
- 9.143 Front line staff will receive bespoke training, developed with our partners to allow them to identify the key warning signs of fuel poverty and refer customers to appropriate organisations that can help.

Stakeholder views

- 9.144** Stakeholders state that WPD has a key responsibility to continue to support vulnerable people, by providing practical support during power cuts and more proactive preparation advice and information in advance of an interruption. Expanding our current support services and increasing the amount of information provided to customers, gained strong support.
- 9.145** Taking steps to improve the data held on the PSR was seen as a fundamental step to enable WPD to expand the support services offered to vulnerable customers. As well as working with energy suppliers and other utility providers to improve data-sharing, stakeholders would like WPD to take greater ownership for updating and cleansing the data on the PSR. Stakeholders strongly supported WPD's proposals to establish a team within our contact centre to proactively contact customers to update their records and gain a fuller understanding of their needs, including a commitment to contact PSR customers as a minimum once every two years.
- 9.146** Stakeholders supported WPD's proposals to contact known vulnerable customers every four hours during power cuts, but challenged WPD to shorten these timescale for customers with the most critical dependencies on electricity for medical reasons (e.g. heart and lung machine or kidney dialysis users), especially for power cuts occurring outside of daylight hours.
- 9.147** Stakeholders would like to see the continuation of partnership working and an increased number of trial initiatives and community-outreach projects, with the three-fold purpose of:
- making sure people are more prepared for the possibility of a power cut;
 - improving and tailoring the support offered during power cuts;
 - facilitating access to key information in order to combat the causes of fuel poverty and provide practical assistance to those customers in need.
- 9.148** The common consensus is that there is a role for WPD in helping to tackle fuel poverty and that we are uniquely placed to support customers through the types of interaction we have and the fact that we do not directly bill customers. Stakeholders stressed that WPD must not run the risk of duplicating the services already offered by specific support organisations and charities, and should not directly deliver energy efficiency measures. They stated that WPD should offer a referral service to help customers to access practical support and advice. The key actions for achieving this are the provision of specialist training to customer-facing staff to help them pick up on the warning signs of fuel poverty and building and maintaining a framework of regional support agencies that can handle referrals from WPD.

10 Expenditure

10.1 This section describes the forecast expenditure that is funded through DUoS. It includes:

- the core investment on the networks and business support activities that make this possible;
- other business costs such as business rates and licence fees.

10.2 More detailed discussion of our expenditure plans is included in the Supplementary Annex SA-05, Expenditure, and a description of how the costs were justified is included in Supplementary Annex SA-08, Business performance, efficiency and benchmarking.

10.3 Costs incurred on network related activities that are funded by third parties are excluded.

10.4 Summary expenditure is presented in tabular form (rounded to one decimal place). Descriptions for each investment area describe the main drivers of expenditure requirements.

Summary

- 10.5** In total £9.18bn will be required to be funded through DUoS. £6.25bn for core expenditure and £2.93bn on other costs.
- 10.6** The costs in the following sections are presented at 2012/13 prices. Core investment costs are shown net of any customer contributions, including future efficiency savings and excluding real price effects (RPEs) and pensions.
- 10.7** The cost of pensions and RPEs are shown separately as 'Other expenditure within the Price Control funded through DUoS'. A description of pension costs is included in Supplementary Annex SA-07 Financing the plan.
- 10.8** The elements of the core expenditure are shown in the table below:

Core expenditure funded through DUoS (£m)					
	West Midlands	East Midlands	South Wales	South West	Total
Reinforcement of the network	198.0	267.2	48.6	84.7	598.5
Non-load network investment	664.2	587.3	396.9	575.1	2,223.5
Network operating costs	355.0	370.9	194.1	304.9	1,224.9
Engineering management	288.6	290.8	147.9	214.5	941.8
Corporate activities	87.0	83.2	47.3	75.8	293.3
Workforce renewal	47.7	47.7	35.6	46.9	177.9
Vehicles, IT, property & engineering equipment	237.2	233.1	120.3	201.9	792.5
Total	1,877.7	1,880.2	990.7	1,503.8	6,252.4

- 10.9** Other expenditure within the price control funded through DUoS is shown in the following table:

Other expenditure within the price control funded through DUoS (£m)					
	West Midlands	East Midlands	South Wales	South West	Total
Real price effects	142.0	140.8	71.4	112.0	466.2
Smart metering	16.1	16.9	7.7	11.4	52.1
Rates	276.0	362.7	144.8	146.4	929.9
Licence fees	9.6	10.4	4.0	6.4	30.4
Normal pension contributions	84.7	84.5	62.3	98.8	330.3
Deficit pension contributions	165.7	163.3	172.9	281.3	783.1
Transmission exit charges	107.9	92.7	68.7	71.6	340.9
Carbon reduction commitments	0.8	0.8	0.8	0.8	3.2
Miscellaneous	-1.8	-0.1	-2.3	-0.5	-4.7
Total*	801.0	872.0	530.3	728.2	2,931.4

* Financing costs and tax is not included

- 10.10** The following pages provide a more detailed breakdown of the core expenditure for WPD as a whole and for each licence area.

WPD Total - Core costs funded through DUoS											
Costs excluding RPEs & pensions, including efficiency (£m at 2012/13 prices)	Average per year in DPCRS	Average per year in RIIO-ED1	Spend profile in RIIO ED1								Total RIIO-ED1
			2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	
Customer Related Reinforcement	-7.5	6.5	6.0	5.9	6.2	6.6	6.7	6.7	6.8	7.1	52.0
General Network Reinforcement	53.4	43.4	69.9	64.6	36.6	46.8	36.9	31.8	35.4	25.5	347.5
Reinforcement for Low Carbon Technologies	0.0	24.9	4.7	4.7	9.3	18.3	27.3	36.2	45.0	53.6	199.0
TOTAL - Reinforcement of the Network	45.9	74.8	80.6	75.2	52.1	71.7	70.9	74.7	87.2	86.2	598.5
Asset Replacement	192.4	202.6	203.6	204.4	202.5	203.4	202.7	202.2	201.8	200.2	1620.8
Diversions	25.6	39.2	53.6	52.0	37.2	37.5	28.5	32.9	33.4	38.4	313.5
Quality of Supply (reducing power cuts)	12.6	3.7	5.1	5.1	5.0	4.9	4.9	4.9	0.0	0.0	29.9
Improving service for remote ("worst served") customers	0.3	0.4	0.0	1.6	1.6	0.0	0.0	0.0	0.0	0.0	3.2
Real Time Control Systems and Telecommunications	14.1	12.0	18.9	11.5	24.0	12.5	6.3	8.6	3.6	10.6	96.0
Protecting equipment from flooding risk	4.2	1.9	5.0	4.0	2.3	0.4	0.7	1.3	0.5	0.7	14.9
Enhancing site security, ESQCR and other legal requirements	18.4	11.7	15.7	14.9	14.7	9.9	9.8	9.7	9.6	9.4	93.7
Reducing oil and gas leaks from equipment	4.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	13.6
Undergrounding in National Parks and AONBs	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	8.0
Other Network Investment	9.9	3.7	8.3	9.4	3.0	3.4	2.4	1.4	1.4	0.6	29.9
TOTAL - Non-Load Network Investment	283.4	277.9	312.9	305.6	293.0	274.7	258.0	263.7	253.0	262.6	2223.5
Inspection, maintenance and routine tree cutting	75.0	48.4	49.7	49.3	48.8	48.3	47.9	48.1	47.6	47.2	386.9
Tree clearance to improve network resilience to severe weather	4.2	7.6	7.8	7.7	7.7	7.7	7.4	7.4	7.4	7.4	60.5
Responding to and repairing faults	92.0	88.9	93.5	92.2	90.7	89.3	87.9	86.8	85.9	85.0	711.3
Other network operating costs	7.9	8.3	8.5	8.5	8.4	8.3	8.2	8.2	8.1	8.0	66.2
TOTAL - Network Operating Costs	179.1	153.1	159.5	157.7	155.6	153.6	151.4	150.5	149.0	147.6	1224.9
Engineering management	132.5	117.7	119.9	119.5	118.0	117.4	116.9	117.1	116.6	116.4	941.8
Corporate activities	67.1	36.7	38.0	37.8	37.1	36.7	36.4	36.1	35.8	35.4	293.3
Workforce renewal	20.3	22.2	21.5	22.0	22.4	22.4	22.4	22.4	22.4	22.4	177.9
Vehicles, IT, Property & Engineering Equipment	115.9	99.1	105.2	105.6	89.7	100.0	100.0	100.1	100.7	91.2	792.5
TOTAL CORE COSTS	844.2	781.5	837.6	823.4	767.9	776.5	756.0	764.6	764.7	761.8	6252.4

West Midlands - Core costs funded through DUoS

Costs excluding RPEs & pensions, including efficiency (£m at 2012/13 prices)	Average per year in DPCRS	Average per year in RIIO-ED1	Spend profile in RIIO ED1								Total RIIO-ED1
			2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	
Customer Related Reinforcement	-2.7	2.3	2.10	2.10	2.20	2.30	2.30	2.30	2.40	2.40	18.1
General Network Reinforcement	26.2	15.6	18.40	19.00	16.40	17.60	16.90	11.50	12.10	12.90	124.8
Reinforcement for Low Carbon Technologies	0.0	6.9	1.30	1.30	2.57	5.07	7.55	10.01	12.46	14.87	55.1
TOTAL - Reinforcement of the Network	23.5	24.8	21.80	22.4	21.2	25.0	26.8	23.8	27.0	30.2	198.0
Asset Replacement	62.7	62.0	62.7	63.3	62.2	62.4	62.0	61.6	61.4	60.7	496.3
Diversions	9.4	10.8	9.6	8.8	8.5	9.2	9.5	13.9	13.3	13.3	86.1
Quality of Supply (reducing power cuts)	3.7	1.9	2.6	2.6	2.6	2.5	2.5	2.5	0.0	0.0	15.3
Improving service for remote ("worst served") customers	0.0	0.1	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	1.0
Real Time Control Systems and Telecommunications	5.0	3.1	5.7	3.9	6.8	1.2	1.6	1.9	0.8	2.5	24.4
Protecting equipment from flooding risk	0.6	0.2	0.0	0.1	0.2	0.1	0.2	0.4	0.1	0.1	1.2
Enhancing site security, ESQCR and other legal requirements	5.0	3.0	3.2	3.1	3.1	3.0	3.0	3.0	2.9	2.9	24.2
Reducing oil and gas leaks from equipment	1.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.0
Undergrounding in National Parks and AONBs	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.4
Other Network Investment	1.1	1.2	3.2	3.4	0.7	0.8	0.5	0.3	0.3	0.1	9.3
TOTAL - Non-Load Network Investment	89.2	83.03	87.80	86.50	85.40	80.00	80.10	84.40	79.60	80.40	664.2
Inspection, maintenance and routine tree cutting	25.9	13.7	14.1	14.0	13.8	13.7	13.6	13.7	13.5	13.4	109.8
Tree clearance to improve network resilience to severe weather	1.3	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	15.6
Responding to and repairing faults	28.6	26.3	27.7	27.3	26.8	26.4	25.9	25.6	25.3	25.0	210.0
Other network operating costs	2.4	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.4	19.6
TOTAL - Network Operating Costs	58.2	44.4	46.30	45.80	45.10	44.60	43.80	43.60	43.10	42.70	355.0
Engineering management	44.0	36.1	36.80	36.7	36.2	35.9	35.9	35.8	35.7	35.6	288.6
Corporate activities	27.2	10.9	11.30	11.2	11.0	10.9	10.8	10.7	10.6	10.5	87.0
Workforce renewal	4.6	6.0	5.80	5.9	6.0	6.0	6.0	6.0	6.0	6.0	47.7
Vehicles, IT, Property & Engineering Equipment	36.5	29.7	31.90	31.1	25.0	28.0	31.0	32.3	31.0	26.9	237.2
TOTAL CORE COSTS	283.20	234.72	241.70	239.60	229.87	230.37	234.35	236.61	232.96	232.27	1877.7

East Midlands - Core costs funded through DUOs											
Costs excluding RPEs & pensions, including efficiency (£m at 2012/13 prices)	Average per year in DPCRS	Average per year in RIIO-ED1	Spend profile in RIIO ED1								Total RIIO-ED1
			2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	
Customer Related Reinforcement	-3.2	2.1	1.90	1.9	2.0	2.2	2.1	2.3	2.2	2.2	16.8
General Network Reinforcement	19.8	20.3	46.00	39.4	12.9	14.6	8.5	11.7	19.6	10.0	162.7
Reinforcement for Low Carbon Technologies	0.0	11.0	2.06	2.1	4.1	8.1	12.0	15.9	19.8	23.6	87.7
TOTAL - Reinforcement of the Network	16.6	33.4	49.96	43.4	19.0	24.9	22.6	29.9	41.6	35.8	267.2
Asset Replacement	53.9	52.2	52.60	52.4	52.1	52.0	51.8	52.4	52.3	52.1	417.7
Diversions	9.0	10.5	13.30	12.9	12.6	12.4	8.3	8.2	8.3	8.3	84.3
Quality of Supply (reducing power cuts)	3.7	1.1	1.50	1.5	1.4	1.4	1.4	1.4	0.0	0.0	8.6
Improving service for remote ("worst served") customers	0.0	0.0	0.00	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Real Time Control Systems and Telecommunications	5.7	3.2	5.90	4.0	6.9	1.3	1.9	2.0	0.8	2.6	25.4
Protecting equipment from flooding risk	1.5	0.6	1.30	1.7	0.9	0.1	0.2	0.4	0.2	0.2	5.0
Enhancing site security, ESQCR and other legal requirements	3.9	3.2	3.30	3.3	3.2	3.2	3.1	3.1	3.1	3.0	25.3
Reducing oil and gas leaks from equipment	1.7	0.6	0.60	0.6	0.6	0.6	0.6	0.6	0.6	0.6	4.8
Undergrounding in National Parks and AONBs	0.4	0.1	0.10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8
Other Network Investment	7.7	1.9	4.80	5.3	1.3	1.4	1.0	0.6	0.6	0.2	15.2
TOTAL - Non-Load Network Investment	87.5	73.4	83.40	81.9	79.2	72.5	68.4	68.8	66.0	67.1	587.3
Inspection, maintenance and routine tree cutting	21.2	11.4	11.70	11.60	11.50	11.40	11.30	11.40	11.30	11.20	91.40
Tree clearance to improve network resilience to severe weather	0.7	1.8	1.80	1.8	1.8	1.8	1.7	1.7	1.7	1.7	14.0
Responding to and repairing faults	30.4	30.3	31.70	31.3	30.8	30.4	30.0	29.6	29.3	29.0	242.1
Other network operating costs	2.7	2.9	3.00	3.0	3.0	2.9	2.9	2.9	2.9	2.8	23.4
TOTAL - Network Operating Costs	55.0	46.4	48.20	47.7	47.1	46.5	45.9	45.6	45.2	44.7	370.9
Engineering management	44.1	36.4	37.40	37.1	36.5	36.2	36.1	35.9	35.9	35.7	290.8
Corporate activities	23.4	10.4	10.90	10.80	10.5	10.4	10.3	10.2	10.1	10.0	83.2
Workforce renewal	4.9	6.0	5.80	5.9	6.0	6.0	6.0	6.0	6.0	6.0	47.7
Vehicles, IT, Property & Engineering Equipment	36.4	29.1	29.80	29.3	26.0	28.6	30.1	30.1	31.8	27.4	233.1
TOTAL CORE COSTS	267.9	235.0	265.5	256.1	224.3	225.1	219.4	226.5	236.6	226.7	1880.2

South Wales - Core costs funded through DUoS											
Costs excluding RPEs & pensions, including efficiency (£m at 2012/13 prices)	Average per year in DPCRS	Average per year in RIIO-ED1	Spend profile in RIIO ED1								Total RIIO-ED1
			2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	
Customer Related Reinforcement	-0.5	1.1	1.0	0.9	1.1	1.0	1.2	1.1	1.1	1.3	8.7
General Network Reinforcement	3.6	3.6	2.3	2.3	2.8	7.4	5.8	5.1	1.7	1.2	28.6
Reinforcement for Low Carbon Technologies	0.0	1.4	0.3	0.3	0.5	1.0	1.5	2.1	2.6	3.0	11.3
TOTAL - Reinforcement of the Network	3.1	6.1	3.6	3.5	4.4	9.4	8.5	8.3	5.4	5.5	48.6
Asset Replacement	30.9	35.0	34.1	34.9	34.6	35.9	35.5	34.9	35.2	34.9	280.0
Diversions	3.0	8.3	17.4	17.2	8.8	8.7	3.5	3.5	3.6	3.7	66.4
Quality of Supply (reducing power cuts)	2.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	3.0
Improving service for remote ("worst served") customers	0.2	0.1	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	1.0
Real Time Control Systems and Telecommunications	1.2	2.9	3.6	2.0	5.5	5.0	1.2	2.1	0.9	2.6	22.9
Protecting equipment from flooding risk	1.3	1.0	3.6	2.1	1.1	0.1	0.2	0.1	0.1	0.3	7.6
Enhancing site security, ESQCR and other legal requirements	3.3	1.3	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	10.2
Reducing oil and gas leaks from equipment	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.4
Undergrounding in National Parks and AONBs	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.6
Other Network Investment	0.9	0.2	0.1	0.2	0.3	0.4	0.3	0.2	0.2	0.1	1.8
TOTAL - Non-Load Network Investment	43.7	49.6	61.2	59.2	53.1	52.4	43.0	43.0	41.7	43.3	396.9
Inspection, maintenance and routine tree cutting	12.6	9.9	10.2	10.1	10.0	9.9	9.8	9.8	9.7	9.6	79.1
Tree clearance to improve network resilience to severe weather	1.0	1.6	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.6	12.9
Responding to and repairing faults	11.6	11.6	12.3	12.1	11.9	11.7	11.5	11.3	11.2	11.1	93.1
Other network operating costs	1.1	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	9.0
TOTAL - Network Operating Costs	26.3	24.3	25.4	25.0	24.6	24.3	24.0	23.8	23.6	23.4	194.1
Engineering management	18.8	18.5	18.8	18.9	18.4	18.6	18.3	18.4	18.3	18.2	147.9
Corporate activities	6.4	5.9	6.1	6.1	6.0	5.9	5.90	5.8	5.8	5.7	47.3
Workforce renewal	4.4	4.5	4.2	4.4	4.5	4.5	4.5	4.5	4.5	4.5	35.6
Vehicles, IT, Property & Engineering Equipment	17.0	15.0	15.5	16.6	14.60	17.0	14.9	14.3	13.9	13.5	120.3
TOTAL CORE COSTS	119.7	123.8	134.8	133.7	125.6	132.1	119.1	118.1	113.2	114.1	990.7

South West - Core costs funded through DUoS											
Costs excluding RPEs & pensions, including efficiency (£m at 2012/13 prices)	Average per year in DPCRS	Average per year in RIIO-ED1	Spend profile in RIIO ED1								Total RIIO-ED1
			2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	
Customer Related Reinforcement	-1.1	1.1	1.0	1.0	0.9	1.1	1.1	1.0	1.1	1.2	8.4
General Network Reinforcement	3.8	3.9	3.2	3.9	4.5	7.2	5.7	3.5	2.0	1.4	31.4
Reinforcement for Low Carbon Technologies	0.0	5.6	1.1	1.1	2.1	4.1	6.2	8.2	10.1	12.1	44.9
TOTAL - Reinforcement of the Network	2.7	10.6	5.3	6.0	7.5	12.4	13.0	12.7	13.2	14.7	84.7
Asset Replacement	44.9	53.4	54.2	53.8	53.6	53.1	53.4	53.3	52.9	52.5	426.8
Diversions	4.2	9.6	13.3	13.1	7.3	7.2	7.2	7.3	8.2	13.1	76.7
Quality of Supply (reducing power cuts)	2.8	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	3.0
Improving service for remote ("worst served") customers	0.1	0.1	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	1.0
Real Time Control Systems and Telecommunications	2.2	2.9	3.7	1.6	4.8	5.0	1.6	2.6	1.1	2.9	23.3
Protecting equipment from flooding risk	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.1	0.1	1.1
Enhancing site security, ESQCR and other legal requirements	6.2	4.3	7.8	7.2	7.1	2.4	2.4	2.4	2.4	2.3	34.0
Reducing oil and gas leaks from equipment	1.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.4
Undergrounding in National Parks and AONBs	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	3.2
Other Network Investment	0.2	0.5	0.2	0.5	0.7	0.8	0.6	0.3	0.3	0.2	3.6
TOTAL - Non-Load Network Investment	63.0	71.9	80.5	78.0	75.3	69.8	66.5	67.5	65.7	71.8	575.1
Inspection, maintenance and routine tree cutting	15.3	13.3	13.7	13.6	13.5	13.3	13.2	13.2	13.1	13.0	106.6
Tree clearance to improve network resilience to severe weather	1.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	18.0
Responding to and repairing faults	21.4	20.8	21.8	21.5	21.2	20.8	20.5	20.3	20.1	19.9	166.1
Other network operating costs	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	14.2
TOTAL - Network Operating Costs	39.6	38.1	39.6	39.2	38.8	38.2	37.7	37.5	37.1	36.8	304.9
Engineering management	25.6	26.8	26.9	26.8	26.9	26.7	26.6	27.0	26.7	26.9	214.5
Corporate activities	10.1	9.5	9.7	9.7	9.6	9.5	9.4	9.4	9.3	9.2	75.8
Workforce renewal	6.4	5.9	5.7	5.8	5.9	5.9	5.9	5.9	5.9	5.9	46.9
Vehicles, IT, Property & Engineering Equipment	26.0	25.2	28.0	28.6	24.1	26.4	24.0	23.4	24.0	23.4	201.9
TOTAL CORE COSTS	173.4	188.0	195.7	194.1	188.1	188.9	183.1	183.4	181.9	188.7	1503.8

Customer specific reinforcement

- 10.11** Customers who require an electricity supply to domestic or business properties or wish to export the power from a distributed generator, need to obtain a connection to our network.
- 10.12** Connection costs are subdivided into two categories that are treated differently. Firstly, the assets installed exclusively for the connection are called 'sole user' assets and since the customer funds these they are treated as being outside the price control. Secondly, in some cases there is a requirement to increase the capacity of the existing network to enable the new connection to be made without reducing the security of the network. This customer specific reinforcement is part funded by the customer and part funded through DUoS income and is therefore assessed under the price control process.
- 10.13** The expenditure described in this section relates to customer specific reinforcement.

Connection volumes

- 10.14** Data collected by Oxford Economics on housing stock projections by local authorities has been used to inform our forecast of future volumes of connections.
- 10.15** Although the projections show relatively consistent growth across all four areas, we have reduced the growth rates for most markets segments up to 2017 to represent slow recovery from recession.
- 10.16** WPD forecasts assume that the most buoyant market will be medium sized housing developments that generate cash flow quickly for developers. There will be some growth in larger housing schemes as market confidence returns, but this is assumed to be at half the rate of the Oxford Economics data up to 2017. Commercial and industrial developments will continue but volumes will be flat until 2017.
- 10.17** It is anticipated that distributed generation (DG) will continue to grow, influenced by the availability of financial incentives such as the Feed-in-Tariff. The only exception is onshore wind generation where volumes are predicted to fall away as the number of suitable locations reduces.

Market share changes

- 10.18** Third party connection providers are most active in market segments where there are larger domestic housing estates, commercial developments or distributed generators. This means that third parties carry out fewer projects, but provide a large proportion of connections to properties. It is anticipated that third parties will continue to grow their market share in the majority of market segments, but WPD expects to retain market share in West Midlands and gain back some market share in East Midlands for large schemes, as a consequence of lower prices that are available because of efficiency savings resulting from the takeover by WPD.
- 10.19** As an example, within the forecast for the market segment for low voltage connections with high voltage work (LVHV) the following market share changes have been assumed.

Proportion of LVHV demand connection projects carried out by third parties (2012 to 2023)				
Market Segment	West Midlands	East Midlands	South Wales	South West
LVHV	Held at 15%	Reduction from 25% to 20%	Increase from 1% to 10%	Increase from 1% to 12%

Impact of low carbon technology

10.20 As customers adopt more LCTs and the associated load growth uses up existing network capacity, more connection projects will require the existing network to be reinforced. The cost forecasts assume that the percentage of projects requiring reinforcement grows by 0.25% per annum for low voltage connections with only low voltage work and 0.5% per annum for low voltage connections requiring high voltage work. It is assumed that there is no impact for higher voltage connections.

Extending the scope of contestable works

10.21 The promotion of competition in connections has led to customers having a choice for the provision of certain parts of a connection. WPD has been working with third party providers to extend the scope of what third parties can do and will continue to develop processes to allow further expansion of contestable works. This will include allowing third parties to work on the existing network to complete final connections and the customer specific reinforcement. It has been assumed that by the end of RIIO-ED1 the majority of reinforcement work at LV and HV will be contestable and third parties will have the opportunity to carry out the reinforcement in addition to installing assets specifically for the new connections.

Customer specific reinforcement expenditure forecast

10.22 The costs of customer specific reinforcement are subdivided into two main components:

- customer funded reinforcement (where the customer pays for their proportion of any additional capacity provided upstream of the connection);
- DUoS funded reinforcement (where WPD receives an allowance through the price control mechanism to cover the costs of the remaining proportion of upstream reinforcement).

Customer specific reinforcement in RIIO-ED1 (£m)					
	West Midlands	East Midlands	South Wales	South West	Total
Customer funded reinforcement	10.4	12.0	7.2	7.9	37.5
DUoS funded reinforcement	18.1	16.9	8.6	8.4	52.0

General network reinforcement

Introduction

10.23 The statutory requirements for the amount of capacity that must be provided to meet demand are driven by our Licence (requiring compliance with a National Standard on Security of Supply – P2/6) and the Electricity Supply, Quality and Continuity Regulations (ESQCR) that encompass requirements on adequacy of equipment, voltage levels, disturbing loads etc. Although temporary relief (derogations) from P2/6 can be applied for, our business processes are designed to avoid the need for these wherever possible.

10.24 The following sections provide an overview of the expenditure in these areas both under our ‘best view’ of the future and some alternative scenarios developed by the Department of Environment and Climate Change (DECC) that have been regionalised by the research company EA Technology.

Drivers

10.25 The UK targets for reducing carbon dioxide emissions require a reduction of 80% by 2050. This target will be met through the decarbonisation of heating and transport, improvements in energy efficiency and producing electricity from renewable sources. The Government has set out, in its Carbon Plan, potential pathways (scenarios) to put the UK on track to halve greenhouse gas emissions, on 1990 levels, by the mid-2020s and on a path towards the 80% reduction by 2050. The impact of this on our networks is significant.

10.26 The known drivers of changes to the demand on the network and hence load related investment are:

- the impact of energy efficiency improvements and demand side response (enabled by the roll out of smart meters);
- the number of new connections (generally around 1% per annum);
- the potential impact of customers installing LCTs;
- the continuing growth in larger scale generation (generally solar, wind, biomass and waste incineration but the potential for Combined Heat and Power).

Impact of low carbon technologies

10.27 We have used a model called ‘Transform’, developed by EA Technology for the DECC/Ofgem led Smart Grid Forum, to forecast the level of expenditure required to accommodate LCTs.

10.28 DECC has produced national scenarios of the uptake of LCTs necessary to meet the Carbon Plan. EA Technology has regionalised these scenarios to determine the volumes in each distribution licence area. The EA Technology scenarios assume that installations of heat pumps and electric vehicles will group together ‘cluster’ in the same manner as the adoption of solar panels.

10.29 WPD’s best view case is based on the results of work commissioned by WPD and undertaken with the CSE in Bristol. This work has derived the likely volume of LCTs and provided a more detailed view of the way LCTs will cluster on the network and drive investment. This data has been used within the Transform model to determine the level of investment.

10.30 The following tables compare the volumes of different LCTs in the best view case against the EA Technology regionalised DECC forecasts.

CSE – ‘On our wires project’

CSE have developed a Housing Assessment Model that analyses housing stock at individual property level, using data on the size of property, built form and wall type (solid or cavity).

From this, CSE have assessed the order in which we can expect groups of like property types to install heat pumps and PV.

Electric vehicle potential uptake has been assessed by CSE using socio-demographic groupings, urban/ not urban locations together with location in local authority areas which already have some electric vehicles.

Cumulative number of retro fit domestic heat pumps at the end of RIIO-ED1				
	WPD ‘Best View’ based on CSE data	Regionalised DECC LOW case	Regionalised DECC MEDIUM case	Regionalised DECC HIGH case
West Midlands	53,683	39,403	105,300	100,579
East Midlands	50,708	47,136	127,152	121,426
South Wales	19,492	78,596	158,996	152,895
South West	72,162	27,074	71,647	68,454

Cumulative kW of retro fit PV installations at the end of RIIO-ED1				
	WPD ‘Best View’ based on CSE data	Regionalised DECC LOW case	Regionalised DECC MEDIUM case	Regionalised DECC HIGH case
West Midlands	135,909	461,626	713,530	962,973
East Midlands	191,506	496,172	774,841	1,050,616
South Wales	54,234	198,600	312,245	424,968
South West	225,281	409,957	588,801	766,876

Cumulative number of electric vehicles charged at existing premises at the end of RIIO-ED1				
	WPD ‘Best View’ based on CSE data	Regionalised DECC LOW case	Regionalised DECC MEDIUM case	Regionalised DECC HIGH case
West Midlands	66,761	62,411	181,772	277,613
East Midlands	77,023	68,622	199,863	305,241
South Wales	28,887	21,316	62,084	94,818
South West	45,014	46,691	135,988	207,689

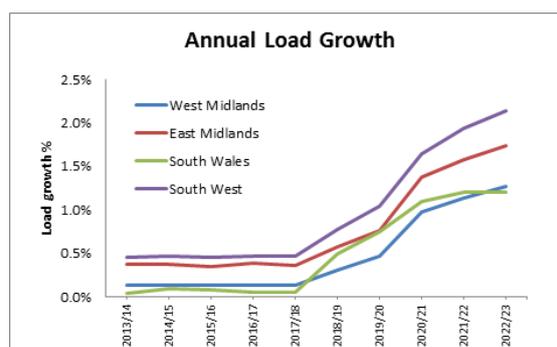
10.31 Where the LCTs will be connected and how close together the connections are has a major impact on the network. The ‘clustering’ assumption used in the Transform model is therefore important as the resulting investment need is very sensitive to this assumption. Knowledge of

this sensitivity was a key driver to undertaking the detailed analysis with CSE. The results of the CSE work indicate that clustering will be very high.

10.32 There is significant uncertainty around the take up of LCTs. The uncertainty section of our plan contains further details of the overall load related reopener that we require to protect both shareholders and customers from either a significantly higher or lower level of investment in this area.

Forecasting overall load growth and expenditure

10.33 The Transform model has been used to derive annual load growth rates. The chart shows that the rate of load growth increases steadily during the RIIO-ED1 period.



10.34 This load growth incorporates LCTs in new properties, the retro-fitting of LCTs and energy efficiency as shown in the tables below:

West Midlands		Annual Load Growth %									
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	
Energy Efficiency	-0.59%	-0.59%	-0.59%	-0.60%	-0.60%	-0.60%	-0.61%	-0.28%	-0.28%	-0.28%	
New Build with LCTs	0.57%	0.57%	0.57%	0.57%	0.57%	0.62%	0.66%	0.69%	0.74%	0.78%	
Retro Fit LCTs	0.15%	0.15%	0.15%	0.16%	0.16%	0.30%	0.42%	0.58%	0.70%	0.81%	
Combined Growth	0.13%	0.14%	0.13%	0.13%	0.14%	0.31%	0.47%	0.98%	1.14%	1.28%	

East Midlands		Annual Load Growth %									
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	
Energy Efficiency	-0.69%	-0.69%	-0.70%	-0.70%	-0.71%	-0.71%	-0.72%	-0.33%	-0.33%	-0.33%	
New Build with LCTs	0.85%	0.85%	0.84%	0.84%	0.84%	0.90%	0.97%	1.00%	1.08%	1.13%	
Retro Fit LCTs	0.21%	0.21%	0.21%	0.21%	0.22%	0.35%	0.48%	0.70%	0.82%	0.93%	
Combined Growth	0.37%	0.37%	0.34%	0.39%	0.36%	0.57%	0.76%	1.38%	1.58%	1.73%	

South Wales		Annual Load Growth %									
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	
Energy Efficiency	-0.68%	-0.68%	-0.69%	-0.69%	-0.70%	-0.70%	-0.71%	-0.35%	-0.35%	-0.35%	
New Build with LCTs	0.59%	0.62%	0.61%	0.59%	0.58%	0.88%	1.02%	0.93%	0.99%	0.96%	
Retro Fit LCTs	0.12%	0.13%	0.13%	0.13%	0.14%	0.27%	0.37%	0.46%	0.51%	0.54%	
Combined Growth	0.04%	0.09%	0.07%	0.05%	0.05%	0.50%	0.75%	1.09%	1.20%	1.20%	

South West		Annual Load Growth %									
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	
Energy Efficiency	-0.62%	-0.62%	-0.60%	-0.60%	-0.61%	-0.61%	-0.61%	-0.29%	-0.29%	-0.29%	
New Build with LCTs	0.87%	0.88%	0.88%	0.88%	0.88%	0.94%	1.00%	1.06%	1.14%	1.20%	
Retro Fit LCTs	0.20%	0.21%	0.21%	0.21%	0.22%	0.47%	0.68%	0.90%	1.12%	1.28%	
Combined Growth	0.45%	0.46%	0.46%	0.46%	0.46%	0.77%	1.05%	1.65%	1.94%	2.14%	

Note that individual growth rates do not summate to give precise combined rate because of interaction of these within the Transform modelling.

10.35 The elements of load growth and their inputs have been cross-checked against other sources. For example the levels of energy efficiency have been checked against The Carbon Plan, and new housing additions against Oxford Economics dwelling stock forecasts and each regions recent historic connection rates.

10.36 The Transform model has been used to generate secondary network requirements and provide the underlying growth rates at the primary network level. Therefore consistent growth forecasts

have been applied across all voltage levels. The primary network requirements have been further adjusted for significant localised impacts of known developments.

10.37 The generic networks and typical loading characteristics within the Transform model make it inappropriate for the identification of specific EHV network requirements. As such, only the LV and HV elements have been taken from this model, with EHV requirements identified from detailed network analysis. The requirements identified have been adjusted to account for the use of smart solutions at EHV.

Primary network reinforcement requirements

10.38 As described above, investment in the EHV network has been separately assessed to take account of the changes in demand from the growth in connection of LCTs, new connections, generation, and the impact of energy efficiency and expected demand side response.

10.39 This results in expected reinforcement investment at EHV as follows:

EHV and 132kV reinforcement expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	20.0	14.7	1.9	2.0	38.6
RIIO-ED1 Annual Average	10.5	13.6	2.1	1.8	28.1
RIIO-ED1 Total (8 years)	83.9	109.2	17.1	14.3	224.5

10.40 The difference in the amount of investment between our four licenced areas is partly due to the differing sizes of the networks and also due to the forecast starting loads on the networks (as highlighted by the differing starting Load Indices (LIs) – see below) and the higher volumes of specific development areas within the two Midlands areas.

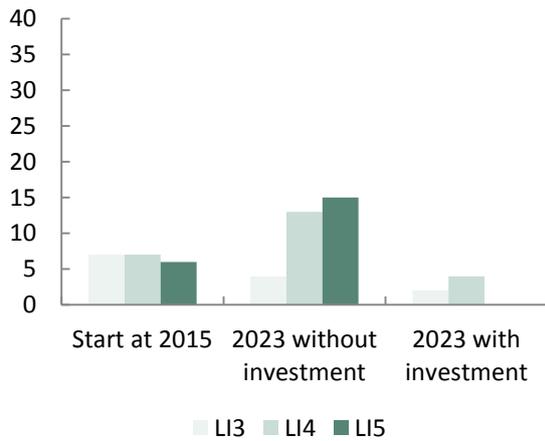
10.41 Load Indices are a measure introduced in DPCR5 to provide an indication of the level of primary substation loading risk within the following general definitions:

LI rank	Definition
LI1	Significant spare capacity
LI2	Adequate spare capacity
LI3	Highly utilised
LI4	Fully utilised, mitigation requires consideration
LI5	Fully utilised, mitigation required

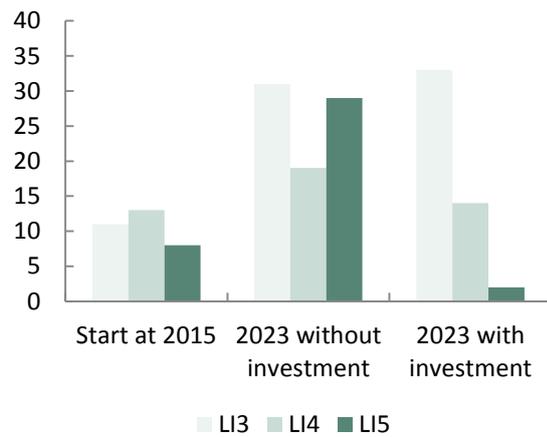
10.42 Using consistent LI thresholds, in line with guidance from Ofgem, the starting LIs and expected movement during the RIIO-ED1 period is as follows:

Load Index changes at EHV and 132kV substations over the RIIO-ED1 period									
	Start at 2015			2023 without investment			2023 with investment		
	LI3	LI4	LI5	LI3	LI4	LI5	LI3	LI4	LI5
West Midlands	7	7	6	4	13	15	2	4	0
East Midlands	11	13	8	31	19	29	33	14	2
South Wales	0	1	0	7	2	0	7	2	0
South West	9	2	0	12	9	11	13	7	0

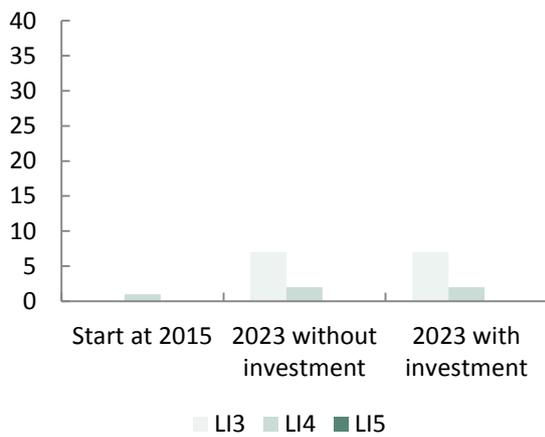
West Midlands Load Index Change



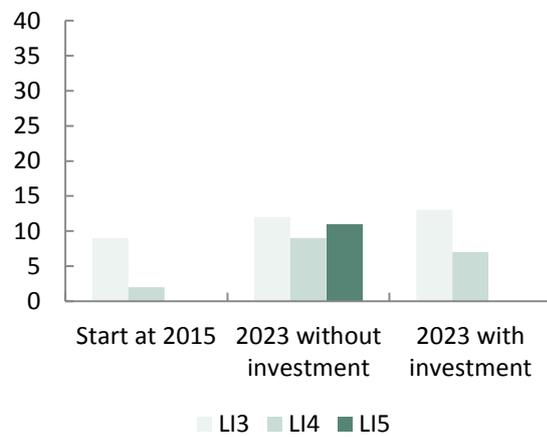
East Midlands Load Index Change



South Wales Load Index Change



South West Load Index Change



Secondary network reinforcement requirements

10.43 Historically, investment in the reinforcement of HV and LV networks has been low as they were generally built with sufficient capacity to accommodate the changing use of electricity. The main driver of reinforcement investment at these voltage levels during RIIO-ED1 and beyond is the expected growth in LCTs being 'retro fitted' in existing properties. A detailed assessment of the output from the Transform model together with assessment of the data provided as part of the CSE work and underlying trends has been used to derive our forecasts.

10.44 This results in expected reinforcement expenditure at LV and HV for traditional and LCT related reinforcement as follows:

Total LV reinforcement expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	0.7	0.8	0.4	0.5	2.4
RIIO-ED1 Annual Average	6.1	9.8	1.4	4.6	21.9
RIIO-ED1 Total (8 years)	49.1	78.3	11.5	36.4	175.4

Total HV reinforcement expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	2.9	3.3	1.1	1.1	8.4
RIIO-ED1 Annual Average	4.2	5.3	1.3	2.6	13.4
RIIO-ED1 Total (8 years)	33.3	42.4	10.7	20.6	107.0

10.45 We have also used the Transform model to assess the alternative levels of expenditure needed for LCT related reinforcement to deliver the different DECC Carbon Plan scenarios as regionalised by EA Technology. Comparison of the results, for LV and HV networks, is shown in the table below:

LV & HV LCT related reinforcement expenditure over the RIIO-ED1 period Comparison of WPD Best View and DECC scenarios (£m)					
	WPD 'Best View' Forecast	Scenario 1 – high emissions abatement in heat provision	Scenario 2 – high emission abatement in transport	Scenario 3 – high electrification of heat and transport provision	Scenario 4 – International Carbon Credit purchases needed to meet targets
West Midlands	55.1	68.7	63.1	75.1	4.7
East Midlands	87.7	186.2	113.3	140.3	5.8
South Wales	11.3	91.2	92.5	90.0	13.5
South West	44.9	34.0	40.3	44.4	2.0
Total	199.0	380.0	309.1	349.8	26.0

(Note: the DECC forecasts are based on the clustering pattern currently seen from the uptake of small scale PV whereas the WPD Best View is based on a more clustered approach following the work undertaken by CSE. If the DECC forecast were to use the higher CSE clustering then the investment levels would be much higher)

10.46 The Transform model uses smart solutions for reinforcement wherever they are a lower cost than 'conventional' solutions which generally add additional assets or replace them with higher capacity ones.

10.47 The Uncertainty section describes how both customers and shareholders are protected from significant errors in the assumptions about the volume or cost of reinforcement needed over the RIIO-ED1 period.

10.48 We will further develop the CSE data together with other information we have on system loads, including the data that will become available via smart meters to develop an LCT hotspot indicator for our network designers.

Fault level capability

- 10.49** Certain faults that occur on the network can allow very high current to flow until the network is switched off automatically by circuit breakers. Although the network is designed to withstand a certain level of fault current, the number of generators and large motors connected to the network can cause the fault current to exceed the rating of the circuit breakers. This introduces a risk of catastrophic failure when they operate.
- 10.50** WPD has a duty of care to its employees and members of the public to ensure that they are not at risk of injury due to the failure of the company's assets.
- 10.51** The situation can change depending on what is connected to the network and we therefore undertake an annual fault level survey to identify the locations and situations where the current fault level potentially exceeds 95% of the switchgear rating.
- 10.52** Solutions are generated to eliminate the risk to safety and restore optimal running arrangements, with the main approach being the replacement of the switchgear for higher rated equipment.
- 10.53** The forecast expenditure to maintain our fault level capability during the RIIO-ED1 period is as follows:

Fault level capability expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	2.5	0.4	0.2	0.2	3.3
RIIO-ED1 Annual Average	1.5	2.5	0.1	0.6	4.6
RIIO-ED1 Total (8 years)	11.7	19.9	0.8	4.8	37.1

- 10.54** The difference between the underlying forecast in South West and South Wales and the two Midlands areas is due to a combination of there being a large number of large power stations located in the Midlands which generally raise fault levels and the anticipated impact of growth in combined heat and power plants in the large urban areas.
- 10.55** Our LCNF FlexDGrid project is seeking to develop better ways of assessing fault level by exploring the potential benefits of enhanced fault level assessment, real-time management of fault level and fault level mitigation techniques.

Asset replacement

10.56 The existing network has developed over many years with a large proportion being installed during the 1950s and 1960s. It contains many assets from different manufacturers that are designed to an evolving range of standards.

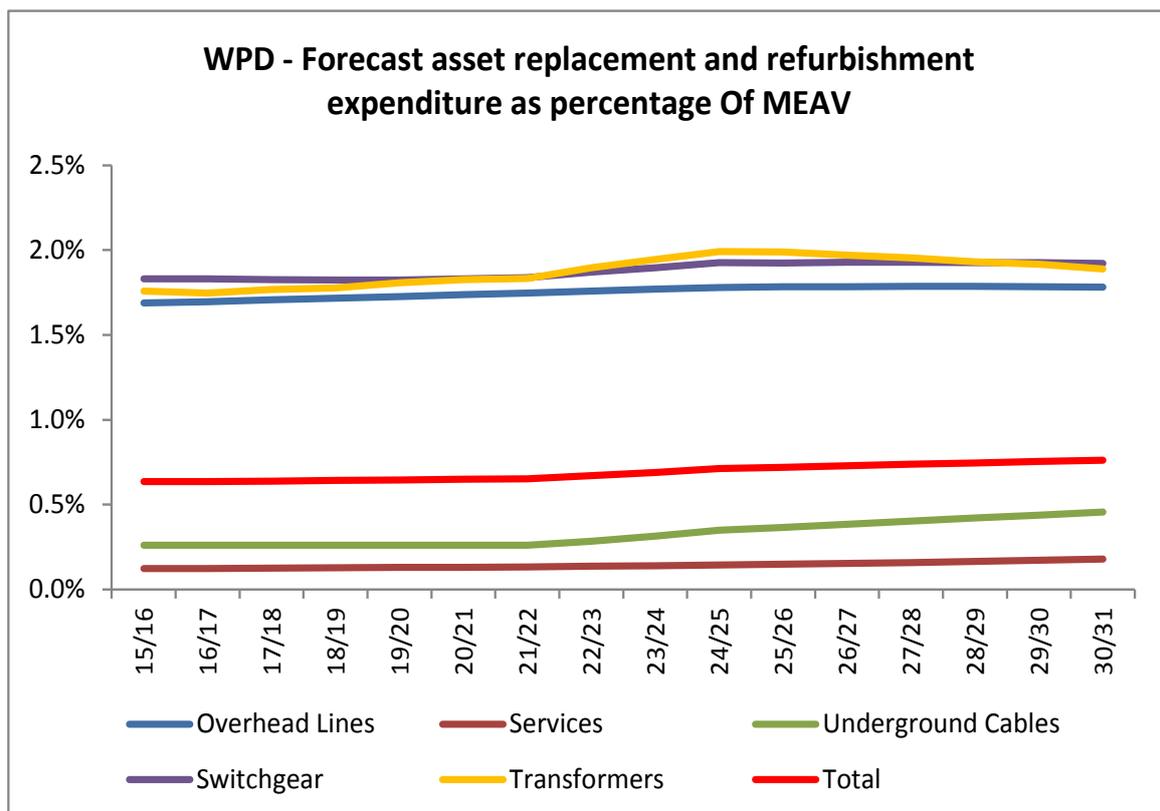
10.57 Network assets are subject to slow but progressive deterioration, influenced by atmospheric conditions, the construction of the assets, material ageing and the duty they are expected to perform. Defects can also arise that limit their operational capability. The replacement of assets in poorest condition counteracts the effect of deterioration of the whole asset base and WPD replaces around 0.6% of the entire asset base each year.

10.58 The chart below shows the asset replacement and refurbishment expenditure as a percentage of the modern equivalent asset value (MEAV) of the whole population.

10.59 Approximately 2% of overhead lines, switchgear and transformers (which have an asset life in the order of 50 to 60 years) will be replaced or refurbished each year during RIIO-ED1.

10.60 0.2% of underground cables and 0.1% of services (which have asset lives in the order of 100 years) will be replaced or refurbished each year during RIIO-ED1.

10.61 From the start of RIIO-ED2 there is a progressive increase in underground cable replacement as more underground cable reaches the end of its life. Even so, the rate of replacement at the end of RIIO-ED2 will be equivalent to a life of 200 years because the most of the underground cable would not have reached the end of its life by 2031.



Replacement forecasting process

10.62 The volume of asset replacement activity is forecast using two techniques: (1) age based survivor modelling to provide long term projections and (2) condition based risk management (CBRM) that refines the requirements in the shorter term. The replacement forecast is derived by consideration of the outputs of both of these analyses.

Survivor modelling

10.63 Since 2000 the industry and Ofgem have used survivor modelling to forecast future replacement volumes. Survivor modelling is a well-established statistical technique that uses the proposition that the older the asset, the greater likelihood that it is in poorer condition and hence the higher probability that the asset will need to be replaced.

10.64 It works by applying a life expectancy distribution to the age profile of the remaining (surviving) assets to determine how many assets require to be replaced. It is especially useful for providing a longer term view of how future requirements will change in relation to current activity.

10.65 Survivor modelling predicts that for the majority of asset categories replacement volumes will level off by the end of RIIO-ED1, except for cables where there will be an increased requirement compared to the very low current volumes of replacement.

Condition based risk management

10.66 Condition based risk management (CBRM) is an asset management approach that evaluates the risk associated with failure of assets due to their condition. It can be used to determine when the condition of an asset has deteriorated to a point that the risk associated with failure is no longer acceptable allowing a forecast of the timely replacement of assets to be developed.

10.67 CBRM uses asset health models, which make use of condition information. This condition information is collected during inspection and maintenance of assets. Condition information is used in combination with other asset specific information, such as age, location and defect history, to define a health value for each asset. This health value is used to determine the probability of failure associated with the condition of each asset. Asset degradation assumptions within the CBRM model predict how the health value will change over time. The speed of degradation is determined by a number of different factors including the original construction of the asset the age of the asset and its environment. The probability of failure of an asset increases as the asset's health degrades.

10.68 The consequence of failure of each asset is different. It is determined by the impact on failure upon customer supply, cost of repair and the asset's location which affects safety and environmental factors. Each asset within the CBRM model has been assessed and assigned a consequence score. This allows assets to be grouped into different consequence bands.

10.69 The risk associated with failure of assets is evaluated by combining the consequences of failure with the probability of failure relating to asset health.

10.70 The output from the CBRM models has been used to undertake cost benefit analysis that compares the cost of replacement against the benefit of removing future risk. This analysis has been undertaken for different levels of consequence of failure, across each asset type in order to determine the point at which replacement delivers optimal benefit for each level of consequence. These replacement trigger points are translated into equivalent trigger health values. Assets with higher consequences of failure are replaced before those with lower consequence of failure.

10.71 The CBRM model applies degradation assumptions to individual assets and those reaching the appropriate trigger value for replacement within the RIIO-ED1 period are identified. This provides a forecast of asset replacement requirements for the RIIO-ED1 period.

10.72 CBRM, combined with cost benefit analysis, provides a more sophisticated assessment of replacement requirements and has enabled WPD to optimise every part of the asset replacement programme.

Replacement and refurbishment activity

Cables

10.73 The majority of underground cables continue to provide a reliable service, but there are certain specific problems that lead to replacement.

10.74 Consac cable is a low voltage cable that is used to distribute power to homes and businesses and was installed during the 1970s in West Midlands and South West. Consac is an aluminium cable that is prone to faults where water ingress causes it to corrode. This corrosion can cause repeat failures on the same piece of network that creates a nuisance for customers. It is expected that volumes of replacement will remain broadly flat during RIIO-ED1.

10.75 Although other, older, types of low voltage paper-insulated cable provide a good service there are areas of the network where repeat faults occur due to their deterioration, historic overloading or ground disturbance. They are more prone to faults in wet ground conditions where water ingress can lead to intermittent interruptions that are difficult to locate. It is expected that volumes of replacement will remain broadly flat during RIIO-ED1.

10.76 Fluid filled cables, containing insulating oil, pose an environmental risk when leaks occur. Although damage can normally be repaired, cables with deteriorated sheaths are prone to regular leaks and are replaced. Following stakeholder consultation, WPD has decided to replace the 1% of cables that have the highest leak rates.

Overhead lines

10.77 Most of the overhead network is built on wooden poles that have a finite life. WPD places a high priority on the replacement of poor condition wooden poles in order to remove weak points and to reduce safety risks and the likelihood of failure. Overhead lines are inspected every seven years and poles found in poor condition are removed from the network within a year of being identified.

10.78 Overhead towers (pylons) are prone to rusting that affects the tower steelwork. Rusting is particularly aggressive near coastal regions. Routine tower painting prevents the most corrosion and in many instances towers can be refurbished by changing the sections of corroded steelwork. Where the corrosion is widespread or affects the main legs or cross arms the replacement of the whole tower is undertaken if necessary to prevent failure.

10.79 Overhead line conductor is susceptible to vibration and movement caused by the wind. This can lead to wear, especially at the points where it is supported. Corrosion also occurs where aggressive atmospheric conditions exist such as salty wet air near the coast.

10.80 Vibration and movement can also affect the fittings used to support the conductor. Components can wear, especially when corrosion causes parts that need to move to seize up.

Switchgear

- 10.81** Switchgear replacement programmes have been in place for a number of years and are targeted at equipment that is in poor condition, has defective components or is of a type that has been involved in an incident leading to an operational restriction.
- 10.82** Switchgear failure can cause significant risk of injury to staff and damage to premises and there is a national system, administered by the Electricity Networks Association for reporting defects and dangerous situations. This allows sharing of knowledge so that companies can respond to issues found across the industry. This is especially important when catastrophic failures are caused by the design of equipment or failure of a critical component. In these circumstances the whole population of the equipment or component have to be replaced.

Transformers

- 10.83** Ground mounted distribution transformers are robust items of plant that have limited moving parts. Therefore the main problems encountered with ground mounted transformers result from rust and from the degradation of insulation caused by excessive loads or moisture ingress. Transformers will be replaced based upon condition assessments and oil test results.
- 10.84** The failure of higher voltage, larger transformers (supplying thousands of customers) can have a significant impact on network security. The failure of these transformers is usually caused by a combination of the demand placed upon the transformers, the effect of moisture ingress and the atmospheric corrosion of steelwork and seals. Oil testing is used to assess the internal condition and transformers are changed where tests suggest evidence of electrical discharge or significant insulation degradation.

Replacement and refurbishment expenditure

Total asset replacement expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	51.9	46.7	25.8	37.4	161.8
RIIO-ED1 Annual Average	50.7	42.4	29.7	44.8	167.6
RIIO-ED1 Total (8 years)	406.0	338.9	237.5	358.3	1,340.6

Total asset refurbishment expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	4.7	2.7	2.8	3.5	13.7
RIIO-ED1 Annual Average	3.5	3.1	2.4	3.2	12.1
RIIO-ED1 Total (8 years)	28.0	24.4	19.1	25.3	96.8

Summary volumes

Volumes of assets to be replaced in RIIO-ED1		
Asset Type	Volume	Percentage of Population Removed (Average per Annum)
Low voltage underground cable	1,197	0.2%
High voltage underground cables	675	0.2%
132kV, 66kV & 33kV underground cable	268	0.8%
Overhead line conductor (all voltages)	11,683	1.6%
Poles (all voltages)	263,656	2.4%
Towers	92	0.1%
Low voltage switchgear	12,729	1.3%
HV pole mounted switchgear	6,333	1.3%
HV ground mounted switchgear	14,655	1.9%
132kV, 66kV & 33kV switchgear	3,962	2.8%
HV pole mounted transformers	16,290	1.6%
HV ground mounted transformers	5,998	1.3%
132kV, 66kV & 33kV transformers	387	1.9%
Low voltage services	194,898	0.3%

Buildings and civil structures

10.85 It is important that substation buildings, sites and fences remain in good condition and secure in order to protect network assets and provide a safe working environment for staff. Substations will be refurbished where defects are found.

10.86 Cable bridges are used to cross waterways, especially in the Midlands where there is an extensive network of canals in Birmingham and the Black Country. Many of these structures are constructed from lattice steelwork, with external cladding and they can carry several cables. Where necessary steelwork will be replaced or refurbished to ensure they remain secure.

Civil works expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	6.0	4.6	2.3	3.9	16.7
RIIO-ED1 Annual Average	7.8	6.8	2.9	5.4	22.9
RIIO-ED1 Total (8 years)	62.4	54.4	23.5	43.2	183.5

Diversions and conversion of wayleaves to easements

10.87 WPD needs agreements with property owners when assets are installed on private land. Wayleave agreements are used in most cases because they are cheaper than easements or other legal arrangements. Wayleaves are licences that pay landowners an annual rental, but they have the drawback that they can be terminated at the request of the landowner. Easements are permanent rights of way in perpetuity.

Diversions due to wayleave terminations

10.88 Diversions are needed when landowners request that assets are moved. This may be because of the construction of a house extension or to enable the development of land. Diversions are also needed when large infrastructure upgrades take place such as the proposed electrification of the Paddington to Swansea rail line.

Conversion of wayleaves to easements and injurious affections

10.89 In some cases, diversions can be very expensive and so WPD negotiates to keep the existing routes. When a permanent right of way is required, WPD will negotiate a compensation payment in exchange for the conversion of a wayleave to an easement.

10.90 Although WPD aims to minimise expenditure, the value of compensation claims can be very high. Where necessary we use statutory powers to establish a reasonable settlement.

10.91 Over the last 10 years, a number of compensation agents have established themselves, specialising in injurious affection compensation due to overhead electricity lines affecting property prices. Landowners or their agents submit a wayleave termination together with an offer to negotiate a permanent easement. Each claim is rigorously challenged but the settlement of cases across the industry has inevitably established a “going rate” for injurious affection payments.

10.92 The expenditure forecast and activity volumes for diversions and the conversion of wayleaves to easements reflect historic trends that we expect to continue.

Summary expenditure

Diversions and conversion of wayleaves to easements (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	9.4	9.0	3.0	4.2	25.7
RIIO-ED1 Annual Average	10.8	10.5	8.3	9.6	38.9
RIIO-ED1 Total (8 years)	86.1	84.3	66.4	76.7	313.5

Quality of supply

- 10.93** WPD has the best track record of any DNO for improving network performance.
- 10.94** Although stakeholders have indicated that reliability performance is good, they have required that performance should remain the same or get better.
- 10.95** The proposed investment programme will increase the number of automated devices on the network. Increasing the amount of automation will enable computer controlled reconfiguration of the network when a fault occurs that will, in turn, reduce the number of customer affected by faults will speed up the restoration of supplies.

Quality of supply expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	3.7	3.7	2.4	2.8	12.5
RIIO-ED1 Annual Average	1.9	1.1	0.4	0.4	3.7
RIIO-ED1 Total (8 years)	15.3	8.6	2.9	2.9	29.7

Worst served customers

- 10.96** There is a small number of customers that experience high numbers of faults. These customers are generally located on the end of long circuits or on remote parts of the network, with limited alternative networks to provide supplies when faults occur.
- 10.97** Stakeholders have indicated that they support investment on worst served customers provided it yields an improvement of service for those customers. During RIIO-ED1 WPD will reduce the number of worst served customers by 20% from 20,000 to 16,000.
- 10.98** The investment will provide additional protection equipment to prevent faults affecting worst served customers. Where low cost solutions can be found, network reconfiguration and interconnection will also be carried out to enable supplies to be re-routed quickly when faults occur.

Worst served customer expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	0.0	0.0	0.2	0.1	0.3
RIIO-ED1 Annual Average	0.1	0.0	0.1	0.1	0.4
RIIO-ED1 Total (8 years)	1.0	0.2	1.0	1.0	3.1

Operational IT&T **(Real time control systems and telecommunications)**

10.99 WPD uses a dedicated communication infrastructure to monitor the loads flowing through the electricity network, understand its operational state and remotely control devices. This operational IT&T system consists of three elements:

- devices installed at substations that collect information locally and link to the communications network;
- communication infrastructure that carries the data between the substations and central control rooms;
- control centre hardware that collates the information and allows engineers to control the network in real-time.

10.100 The proposed expenditure will maintain the integrity of the systems, whilst incorporating necessary network expansion and improving reliability and security.

Substation devices

10.101 The electronic devices used to connect remote sites to the communications network are collectively known as Remote Terminal Units (RTUs). They have a life expectancy of around 15 years. An extensive replacement programme across West Midlands and East Midlands was completed in 2012 and so no further expenditure will be required until RIIO-ED2 in these areas. The replacement of RTUs in the South West and South Wales will be carried out over a five year period between 2014 and 2018, with the programme being completed by the third year of RIIO-ED1.

Communications infrastructure and Cyber security

10.102 WPD has developed its own internally managed telecommunications infrastructure for operational data communication. This approach is cost effective, reliable and more resilient when compared to third party providers.

10.103 The infrastructure comprises scanning radio that transmits data from radio transmitters located remotely on a range of network assets to base-stations located at major substations. Microwave and fibre optic communications then transfers the data between the base-stations and our control centres.

10.104 Within West Midlands and East Midlands, mobile phone GPRS technology is currently used to communicate with remote devices. GPRS communication does not provide sufficient reliability and is not fully secure, with the potential for third party interference.

10.105 GPRS devices will reach the end of their life through the RIIO-ED1 period and at this point they will be replaced with our standard scanning radio network to create a more secure common platform across the whole of the WPD network.

10.106 In addition many of the existing scanning radio system transmit data on unlicensed channels. Other users can broadcast on the same frequencies and this can cause interference leading to failures in the communication of data. Where this occurs licenced solutions will be installed to provide exclusive use of channels.

10.107 We will further enhance security by applying additional data signal encryption in order to limit the potential for third party interference in our network.

Control centre hardware and software

- 10.108** Due to its strategic importance, the hardware used for the WPD control system is upgraded every five years to take advantage of technological developments in processing speed and capability. It is anticipated that the next generation of hardware will allow continuous calculation of network parameters such as dynamic load flows and fault levels, which will set the foundation for smarter network operational control.
- 10.109** Software is regularly updated to take advantage of improvements in functionality. These advances are predominantly driven by WPD and each extension to functionality is subject to revised licencing charges. The cost forecasts are in line with previous developments carried out over the last 10 years.

Foundation for smart grids

- 10.110** In the general network reinforcement section of this document we refer to using the Transform model to assist in understanding the investment needs driven by the expected growth in LCTs. As part of its output, this model assesses the need for enabler technologies that support the development of a smart grid, such as data communication and analysis systems.
- 10.111** The majority of communication technologies that the Transform model identifies are local monitoring and control systems. The costs of these local control systems are included in the load related expenditure.
- 10.112** The communication between these local control schemes and central control centres will require additional communications infrastructure that is forecast to cost around £5m over the RIIO-ED1 period.

Expenditure summary

Operational IT&T expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	5.0	5.7	1.2	2.2	14.1
RIIO-ED1 Annual Average	3.0	3.2	2.9	2.9	12.0
RIIO-ED1 Total (8 years)	24.3	25.4	22.9	23.4	95.9

BT 21st Century (BT 21CN)

- 10.113** WPD rents a number of telecommunication circuits from BT which are used for protection and SCADA. Dedicated circuits have been used to provide fast fault clearance times to maintain the stability of the transmission system, distribution networks and connected generators.
- 10.114** BT is in the process of converting its existing network to an internet protocol system known as BT 21st Century Network (BT 21CN). Since the communication path for each transmission of data is not predetermined, there could be delays in delivering the signals that may cause electricity distribution network protection systems to function incorrectly.
- 10.115** WPD plans to replace all telecommunication circuits affected by BT 21CN with circuits owned and operated by WPD's own telecommunication company, Surf Telecom. Three generic solutions have been proposed using fibre optic, microwave and UHF radio. It is proposed that all work will be completed in South Wales and South West by the end of DPCR5, with work on 75 protection and 200 SCADA circuits in West Midlands and East Midlands being carried out during RIIO-ED1.

BT 21CN expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	1.1	2.1	0.8	0.2	4.2
RIIO-ED1 Annual Average	0.7	1.1	-	-	1.8
RIIO-ED1 Total (8 years)	5.9	8.8	-	-	14.7

Black Start

- 10.116** Although extremely rare, a number of blackouts across the world over the last decade (in the USA, Europe and across India) have highlighted that very widespread supply interruptions (blackouts) can occur. Blackouts can be triggered by a coincidence of circumstances that as a result of standard network running arrangements, cause disconnections of customers to cascade as each alternative network reacts to the situation. Recovery from the blackout - a 'Black Start' - can take a number of days as generation stations return online and network loads are balanced with the output of generation.
- 10.117** The electricity industry has developed a standard that requires major substations to have the resilience to remain operational for 72 hours. The main consideration in meeting this standard is the length of time that control and protection batteries will last.
- 10.118** WPD will make all substation battery systems at major substations resilient to 72 hours. This will be achieved by increasing the capacity of batteries used for control and installing load disconnection schemes to manage the drain on batteries used for tripping of switchgear and protection.
- 10.119** In addition, telecommunications are essential to the organisation and coordination of the resources needed for successful restoration of supplies. WPD therefore proposes to carry out a range of works (such as installation of generation to improve the backup power supplies at key telecommunications sites to 72 hours resilience). This additional work only applies to the West Midlands and East Midlands businesses.

Black Start expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	-	-	0.1	-	0.1
RIIO-ED1 Annual Average	0.4	0.8	0.2	0.4	1.9
RIIO-ED1 Total (8 years)	3.3	6.4	1.6	3.5	14.8

Protecting equipment from flooding risk

10.120 Widespread flooding across the UK in 2007 affected network assets and interrupted electricity supplies to thousands of customers in Gloucestershire and Yorkshire. These interruptions highlighted the potential vulnerability of electricity substations to flooding. Following a Government review and the publication of the Pitt Report, a programme of flood defences was instigated.

10.121 Climate change predictions suggest that flooding could become a more regular occurrence.

10.122 WPD has been working with the Environment Agency to identify the substations at greatest risk and by the end of DPCR5 an additional 120 substations will have been protected. Stakeholders have indicated that investment in flood defences is a high priority and consequently during RIIO-ED1 the WPD programme will be extended to a further 75 sites, protecting customers from the risk of power cuts due to flooding.

10.123 Investment will be used to build protective walls around vulnerable equipment.

Flood defence expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	0.6	1.5	1.3	0.8	4.2
RIIO-ED1 Annual Average	0.1	0.6	0.9	0.1	1.8
RIIO-ED1 Total (8 years)	1.1	4.9	7.5	1.1	14.6

Critical National Infrastructure Security

10.124 WPD works with the security services and the Centre for the Protection of the National Infrastructure (CPNI) to take even more stringent security measures at sites that are key to the UK. The CPNI assessments consider the number of customers connected to a specific site, its criticality to the network in general or its role in supporting key installations or customers. When a site is defined as being part of the CPNI list, additional security works are undertaken to increase the protection of the site.

10.125 The measures include the installation of enhanced and electrified fences, alarm systems and CCTV systems. Expenditure expectations are forecast to be £5m with costs being recovered once work is completed.

Substation security

- 10.126** WPD has legal obligations to operate its distribution networks safely and reliably. In addition to the protection of the general public from dangers of electricity and the reduction of the risk of personal injury to staff there is also a heightened requirement to ensure sites and assets are secure to prevent third party trespassing, vandalism and theft.
- 10.127** Although it is virtually impossible to prevent access by a determined thief, improved deterrent measures are required to deter unauthorised access and to make it more difficult.
- 10.128** At larger substations intruder alarms and security specification doors will be installed. CCTV will be added to higher risk sites and electric fences will be added to very high risk sites.
- 10.129** At distribution substations innovative tagging and identification systems will be installed allowing stolen equipment to be more readily traced to deter theft.

132kV & EHV site security expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	1.6	1.0	1.6	1.0	5.2
RIIO-ED1 Annual Average	0.8	1.4	-	-	2.2
RIIO-ED1 Total (8 years)	6.3	10.8	-	-	17.1

Distribution substation security expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	0.2	0.2	0.0	0.0	0.4
RIIO-ED1 Annual Average	0.3	0.2	0.1	0.1	0.7
RIIO-ED1 Total (8 years)	2.3	1.4	0.7	0.7	5.1

Overhead line clearance to ground

- 10.130** The ESQCR specifies ground clearance requirements for overhead lines that span across roads. This is to ensure that vehicles passing under the lines have sufficient clearance without the risk of snagging the lines.
- 10.131** Advances in line height measurements techniques now allow staff to measure the height of road crossings from the side of the road. These new instruments have identified that around 20% of road crossings, mainly overhead services, are non-compliant with clearance requirements.
- 10.132** Overhead lines that do not meet the requirements will be rebuilt to increase the height across roads. This will require taller poles and overhead line re-conductoring.
- 10.133** The work to correct any shortcomings will carry on throughout DPCR5, but there will be a need to continue into RIIO-ED1. The following table shows the costs specifically for this activity. These costs are included in the overall legal and safety costs.

Legal and safety – overhead line clearance to ground expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	0.7	0.6	0.5	1.0	2.8
RIIO-ED1 Annual Average	1.8	1.4	1.2	2.3	6.7
RIIO-ED1 Total (8 years)	14.2	11.6	9.3	18.4	53.5

Total legal and safety expenditure

10.134 In addition to ground clearance and security work there are a range of lower cost investments proposed for safety and legal reasons including dealing with asbestos and installing fire protection. The total expenditure is shown below:

Legal and safety expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	3.0	2.6	2.1	2.1	9.8
RIIO-ED1 Annual Average	3.0	3.2	1.3	2.5	9.9
RIIO-ED1 Total (8 years)	24.2	25.3	10.2	19.9	79.6

Compliance with ESQCR Regulation 18

10.135 Regulation 18 of the Electricity Safety, Quality and Continuity Regulations (ESQCR) 2002 specifically deals with the clearance of overhead lines to structures. New overhead lines are designed to be clear of buildings and other obstacles to reduce the risk of inadvertent contact. Where existing lines are close to buildings, the regulations require that lines are modified to remove the risk.

10.136 WPD has identified the locations where work is required and the majority of the programme will be completed in DPCR5, but there will be part of the programme in the South West that will continue into RIIO-ED1.

ESQCR horizontal clearance expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	2.0	1.3	1.1	4.1	8.5
RIIO-ED1 Annual Average	-	-	-	1.8	1.8
RIIO-ED1 Total (8 years)	-	-	-	14.1	14.1

Metal theft remedial actions

10.137 Significant increases in the prices of commodities such as copper and aluminium have resulted in increased incidence of theft, especially theft of copper low voltage overhead lines and earthing conductors located within primary and distribution substations.

10.138 WPD has been proactively working with police forces to assist in crime prevention. We have provided guidance to improve the identification of recovered stolen materials and facilitated meetings with neighbouring forces to ensure that intelligence is shared across police area boundaries. Although this has led to a number of arrests and prosecutions, theft continues to be a problem.

10.139 In addition to safety risks the consequences of theft are the need for remedial works to replace the stolen assets, repairs to damaged fences and doors, interruptions to supply and inconvenience for customers.

10.140 The costs for metal theft remedial actions are included within the totals for Trouble call.

Reducing technical losses

10.141 An electricity network uses energy to facilitate the delivery of power to customers. Some of this energy is fixed and is related to the network (mainly transformers) being energised. The remainder is variable and related to the level of electrical load which is flowing through cables and wires causing a heating effect. The summation of this energy is referred to as technical losses.

10.142 Another reason for electricity losses is where there is no meter or supplier at the final connection to record the usage. There are situations where a connection has been made to our system without authority. The energy used in these connections is not metered and does not feature in volumes that suppliers register. As a result it is shown as a loss on our network. This is known as theft in conveyance or illegal abstraction

Improved understanding of losses

10.143 We plan to improve our understanding of losses by using the established highly monitored network in South Wales which supported the Low Carbon Network Fund (LCNF) LV Templates project. This network can measure the power supplied into this network at HV and also measure the power delivered from the LV substations. The losses in this section of network will be due to technical losses, as most illegal abstraction occurs beyond this point on the LV network. We will investigate ways of extrapolating this data to provide reliable loss baselines for different network types.

Addressing losses in transformers

10.144 To reduce the variable losses in a transformer the resistance of the wires needs to be decreased, which can be done by increasing the cross sectional area of the wires or using materials with a lower resistance. To reduce the fixed losses the efficiency of the magnetism needs to be improved, which can be done by using materials with better magnetic properties.

10.145 The additional costs of low loss transformers have long pay-back periods which normally make them uneconomic.

10.146 New legislation is anticipated to be passed in the EU during the RIIO-ED1 for the mandatory installation of low loss transformers. Although the implementation of this law is not expected for some time, the impact would be in the order of £5m per annum based on manufacturers' estimates and current price difference between "normal" and low-loss transformers.

10.147 WPD believe that any obligation arising before the end of RIIO-ED1 will be minimal and we will absorb the higher costs through efficiency improvements elsewhere.

10.148 In the meantime WPD will adopt a selective programme of oversizing transformers where we identify coincident LCT clustering that requires re-sizing of the transformer at a later date. Data from the CSE informs us that 7% of the network will be subject to LCT hotspots and to deal with these we will install 109 oversize transformers at an incremental cost of £0.1m per annum.

Addressing losses in cables

10.149 To reduce the variable losses in a cable the cross sectional area of the conductors needs to be increased. Once a cable is laid and the ground is reinstated, there is very little chance to make alterations to the cable. We will take the opportunity whilst installing cable to consider whether a larger size will provide a loss reduction. Data from the CSE informs us that 7% of the network will be subject to LCT hotspots and consequently we will use larger cable in these situations. This will equate to 75km per annum being installed with a higher rating and lower losses. The incremental cost will be £0.3m per annum.

Demand side management (DSM)

10.150 Assets working at their maximum capacity will lead to significantly more losses than those with a reduced loading. The scale of variable losses can therefore be reduced by simply reducing the demand on the network or by reconfiguring networks to transfer loads from highly loaded circuits to lower loaded circuits. In our LCNF projects we are developing methods to monitor and automatically reconfigure networks. Where these networks can be meshed (operated in parallel) and loads transferred it will be possible to reduce the overall losses.

Imbalance and power factor

10.151 We will look to develop new ways of addressing loading imbalance and improvement to power factor. We are already developing a project with a solar generation customer that will use the customer's inverter equipment to alter the phase angle of the generated power. It will also use local storage to set the generated power per phase to reduce overall network imbalance.

Theft in conveyance

10.152 Theft of electricity from our network adds to the level of recorded losses, but is difficult to detect exactly where it is occurring.

10.153 We plan to use the "addresspoint" standard to produce a list of premises which do not have an electricity supply registered to them. By starting from the assumption that all premises in the UK have an electricity supply, we can use this list to establish a subset of premises without a registered supply and which would require a physical inspection. This desktop analysis will make the targeting of potential theft a much more efficient system.

Expenditure

10.154 We propose to cover the cost of the larger size assets through efficiency savings. We therefore have not requested any specific allowances for this activity.

Environmental

Reducing oil leaks from equipment

- 10.155** The design of very high voltage underground cables has evolved over many years and our new cables use a solid plastic insulation. Old designs of 33kV and higher voltage cables used insulation oil inside the cable. Although these cables are normally very reliable, the oil may leak out if they are damaged. The oil is biodegradable in the long-term, but leaks can cause immediate environmental damage to land and water courses.
- 10.156** The cables are monitored to allow quick response should a leak arise but traditional methods of leak location can be slow and expensive.
- 10.157** WPD has helped in the development of a technique to help pinpoint leaks more quickly, thereby reducing the amount of oil lost in the environment before a cable is repaired. We have been trialling a new technique called PFT tagging. PFT tagging adds a tiny amount of tracer to the fluid in the cable and if a leak occurs the tracer can be detected. Identifying the source of the tracer locates a leak quickly and to within a few meters, reducing both the amount fluid leaking into the environment and extent of excavation. The programme of tagging will be extended to all cables that have a history of leaks.
- 10.158** In addition, the asset replacement programme will replace the 1% of cables that have the highest leak rates, especially where the leaks are due to the deterioration of the cables.

Reducing SF6 gas leaks from equipment

- 10.159** Sulphur Hexafluoride (SF₆) is a gas which is used throughout the industry as an insulation medium in switchgear. It has very good electrical properties and has allowed switchgear to be designed into smaller packages thereby reducing the amount of materials used in the production of switchgear and reducing the physical space needed to build a substation. Although SF₆ has excellent insulating properties it is a potent greenhouse gas. There is no suitable replacement for this gas and it remains in widespread use in the electricity industry.
- 10.160** Over half of stakeholders indicated that the reduction of SF₆ leaks should be a high priority and supported replacing the 1% of switchgear with highest leak rates. The cost of doing so is included in the table below.

Total environmental expenditure

- 10.161** In addition to reducing leaks from equipment we will carry out work to deal with noisy equipment and in a limited number of instances we will underground overhead lines to improve visual amenity in areas *outside* AONBs and National Parks. The total environmental expenditure is shown below:

Environmental expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	1.3	1.7	0.4	1.4	4.9
RIIO-ED1 Annual Average	0.5	0.6	0.3	0.3	1.6
RIIO-ED1 Total (8 years)	4.1	4.6	2.1	2.3	13.2

Undergrounding in National Parks and AONBs

10.162 WPD's geographic area includes a large number of National Parks and AONBs. The distributed nature of the network means that overhead lines are installed within these areas, sometimes near iconic sites. There are locations, especially at popular tourist sites, where the removal of selective overhead lines can enhance visual amenity.

10.163 Stakeholders suggested that the programme of undergrounding should be increased. We will therefore replace 55km of overhead line with underground cable during RIIO-ED1. We will continue to work collaboratively with National Park and AONB representatives to identify the areas that would benefit greatest from the undergrounding of overhead lines.

10.164 The unit costs used within the forecasts shown in the table below are lower than DPCR5 unit costs so as to drive the selection of projects that provide visual amenity improvements for less expenditure:

Undergrounding in National Parks and AONBs expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	0.4	0.4	0.1	0.2	1.2
RIIO-ED1 Annual Average	0.3	0.1	0.2	0.4	1.0
RIIO-ED1 Total (8 years)	2.3	0.9	1.4	3.0	7.7

Inspection and maintenance

10.165 The equipment used in the network normally has a long working life and many assets are operational for over 40 years. To ensure the assets remain in a good condition for the whole of their lifetime, inspection and maintenance is used to preserve their condition.

10.166 WPD's approach to inspection and maintenance is to use periodic inspections to determine the condition of assets. The inspection regime is determined by manufacturers' guidance, national policy, and local awareness e.g. the asset is close to the sea. The results of the inspections inform reactive maintenance, as well as triggering enhanced inspections and/or assessment of asset health for asset replacement considerations if appropriate. Routine maintenance is scheduled to anticipate and limit the impact of degradation.

10.167 The annual costs of the existing inspection and maintenance programmes have reduced as a result of business efficiencies and are expected to remain broadly the same for each year of RIIO-ED1 as shown in the table below:

Inspection and maintenance expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	12.8	12.0	5.7	6.5	37.0
RIIO-ED1 Annual Average	8.0	7.2	4.1	5.4	24.8
RIIO-ED1 Total (8 years)	64.2	57.6	33.0	43.5	198.4

10.168 The inspection of service positions and the identification of defects are currently undertaken by suppliers when they carry out meter readings. The move to smart meters will mean that every service position will be assessed during RIIO-ED1 resulting in the removal of defective service equipment. Once the rollout of smart meters is complete, suppliers will rely on remote reading capability and inspect service positions less frequently. We will be developing an understanding of the impact of these changes to determine whether a service position inspection programme is required in RIIO-ED2.

Tree cutting - routine

- 10.169** Overhead lines are susceptible to damage from growing trees, falling trees and windborne vegetation. Climbable trees near overhead lines also pose a danger to the public where physical contact with conductors is possible. Tree clearance is therefore carried out to reduce the risk of injury to the public and to prevent damage causing interruptions to supply.
- 10.170** Routine clearance is carried out to maintain distances specified within Industry Standard ENA TS 43-8 (that specifies a minimum of 3 metre clearance for climbable trees and 0.8 metres for all others). The majority of tree cutting is a cyclical activity that clears sufficient distance from trees to maintain minimum clearance distances between cuts. Tree cutting remains the most practical and cost effective option compared to the alternatives of replacing open wire LV lines with Aerial Bundled Covered (ABC) conductor, diverting lines (assuming alternative routes can be obtained) or undergrounding.
- 10.171** There are backlogs of clearance in West Midlands and East Midlands that will be removed by the end of DPCR5. Consequently the expenditure in RIIO-ED1 will reduce once the programme is solely based upon routine 5-yearly tree clearance cycles.
- 10.172** Routine tree cutting costs are shown in the table below:

Routine tree clearance expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	13.1	9.3	7.0	9.2	38.6
RIIO-ED1 Annual Average	5.7	4.2	5.7	7.9	23.5
RIIO-ED1 Total (8 years)	45.5	33.6	46.0	63.2	188.2

Tree cutting - improving network resilience to severe weather

- 10.173** During the stormy weather in October 2002 tree related network damage caused some customers in the UK to be without power for up to five days. Following the storm the Government changed the legislation to ensure that DNOs did more to prevent supply interruptions caused by trees. The legal changes required DNOs to operate progressive resilience tree cutting and felling programmes to improve network performance in abnormal weather conditions.
- 10.174** The Government's Regulatory Impact Assessment assumed that clearance should be applied on a modest yet progressive basis, clearing 0.8% of the higher voltage networks per annum resulting in 20% being resilient after 25 years (by 2034).
- 10.175** Stakeholders have taken the view that this programme should be advanced and therefore WPD will deliver the programme within 20 years, increasing the volume from 500km to 700km per annum. The costs of the accelerated programme are shown in the table below:

Resilience tree clearance expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	1.3	0.7	1.0	0.8	3.8
RIIO-ED1 Annual Average	2.0	1.8	1.6	2.3	7.6
RIIO-ED1 Total (8 years)	15.6	14.0	12.9	18.1	60.6

Responding to and repairing faults (Trouble call)

10.176 “Trouble call” includes the activities of responding to reported issues and resolving faults. Trouble call includes incidents that cause customers to go off supply (and are incentivised under the Interruptions Incentive Scheme (IIS)). It also includes occurrences not incentivised (ONIs) where customers are not off supply, such as reports of flashing requiring investigation, call outs to reports of potential break-ins to substations, falling trees that might be near our equipment or gates and/or access doors being damaged. Both IIS and ONI type faults require some form of urgent response.

10.177 When faults happen the priority is the restoration of supply so that customers experience minimal inconvenience. Where appropriate, generators and temporary arrangements are provided to restore supplies when a quick repair is not possible.

10.178 The extensive nature of the network means that there are around 50,000 incidents each year affecting customer supplies and a further 80,000 ONIs where some form of site visit is required. The costs of this response and the associated repairs to the network are shown below.

Responding to and repairing faults expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	28.6	30.4	11.6	21.4	91.9
RIIO-ED1 Annual Average	24.7	28.7	10.8	19.5	83.7
RIIO-ED1 Total (8 years)	197.3	229.5	86.7	155.8	669.4

Substation electricity, remote generation and dismantlement

10.179 WPD has contracts in place for the purchase of unmetered electricity consumed at substations. Forecasts assume that expenditure will continue in line with DPCR5 levels; approximately £6m per annum across the group.

10.180 There are two locations within WPD where the provision of permanent standby generation is needed to provide security of supply to remote networks. In the South West the generation provides security of supply support to the Isles of Scilly and in South Wales it provides security at Tregaron where there is limited 11kV interconnection.

10.181 Very occasionally network assets are dismantled, permanently removed and no alternative assets are installed. This happens where there is no longer a need for an electricity supply or where the progressive development of the network renders other parts of the network unnecessary. Expenditure within this category is low within South West and South Wales at around £1m per year, but within the East Midlands and West Midlands, where there is more change of land usage, cost are approximately £1m per annum.

10.182 The total costs across all three areas are shown in the table below:

Substation electricity, remote generation and dismantlement expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	2.4	2.7	1.1	1.7	7.9
RIIO-ED1 Annual Average	2.5	2.9	1.1	1.8	8.3
RIIO-ED1 Total (8 years)	19.6	23.5	9.0	14.1	66.2

Smart meters

Introduction

- 10.183** Smart electricity and gas meters are due to be installed in all homes in a supplier led mass rollout planned to commence towards the end of 2015 and finish during 2020.
- 10.184** Although the smart meter programme is being managed by the Government in liaison with the main electricity Suppliers, DNOs will play a key part in its successful delivery.
- 10.185** The accelerated nature of the rollout programme (approximately four times quicker than the current meter replacement programme) means that there will be an increase in the number of issues reported about DNO owned service equipment. WPD will be required to rectify these issues to ensure that the rollout programme is not delayed.
- 10.186** Smart meters are expected to provide benefits for WPD with improved business efficiency and customer service. This will require the development of new business processes and systems to support the smart meter environment and utilise the additional facilities and data that will be made available.
- 10.187** The transfer of data and instructions to and from the meter will be managed by a separate central Data and Communications Company (DCC), who will charge users such as WPD for the services provided.

Benefits for WPD

- 10.188** The smart meter programme has the potential to provide data to enhance existing core business activities such as fault management, network planning and asset management. There are also potential benefits which can lead to future applications that will help the deployment of low carbon technologies and move to actively managed networks.
- 10.189** Detailed benefit analysis has been completed for smart metering in conjunction with the ENA. It is expected that over RIIO-ED1 the total gross benefit that WPD would expect to see from smart metering would be in the region of £9m to £12m, with £7.5m relating to benefits associated with applying smart metering to existing business functions.

Fault management

- 10.190** Smart metering will provide a number of functions to support fault restoration and reporting activities. On the occurrence of a supply interruption, 'last gasp' functionality will allow a message to be sent notifying WPD of a loss of supply. This will provide a level of visibility down to the individual premise level that has not been available before. It will also be possible to remotely confirm which customers are on or off supply, aiding efficient supply restoration.

Network planning

- 10.191** Smart metering will increase the data available about the low voltage network providing two major benefits:
- more detailed information about network loading and voltage, that will allow better prioritisation of reinforcement work;
 - better information when designing for new connections, potentially reducing the time to connect as well as the cost of connection.

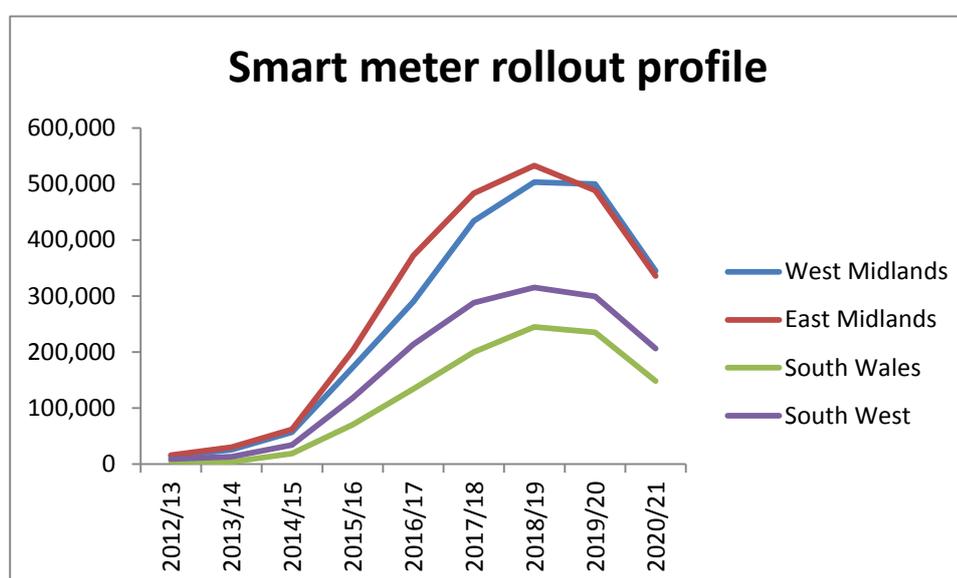
Future applications

10.192 Smart metering functionality has the potential to support more sophisticated future network operations such as load shifting and scheduling, application of variable tariffs and other demand side management techniques. It will also help to support a more active network management approach compared with the more passive approach applied today.

Rectification of service position issues

10.193 The installation programme for smart meters is being controlled by suppliers in liaison with their meter installers. Although in the majority of cases the meter operators will be able to proceed with the meter change, there will be situations where DNOs will need to carry out remedial work to service equipment to allow the installation of a smart meter to proceed.

10.194 The accelerated nature of the rollout programme means that there will be an increase in the number of defects reported. Whilst the programme is on average four times quicker than the current meter replacement rate, the timing of the rollout leads to a peak workload during 2018 and 2019 as illustrated in the following graph derived from supplier data in January 2013:



10.195 The actual number of defects is unknown, but for the purposes of forecasting work volumes and resource requirements it has been assumed that remedial work will be required for 2% of smart meter installations. Over the rollout programme this equates to 148,000 service issues in total. It is assumed that 4,500 would have been identified under business as usual and so there will be an additional 143,500 service issue to resolve. The rectification costs are shown in the table below:

Smart meter related cutout change expenditure in RIIO-ED1 (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
Cutout changes	8.4	9.1	3.9	5.4	26.8

10.196 At the peak of installation it is estimated that 30,000 visits will occur per annum based upon a service issue rate of 2%. This will require the equivalent of 60 staff to be deployed into this activity.

DCC charging arrangements

10.197 A new regulated organisation called the Data and Communications Company will manage the systems for communications between the meters and users of smart meter services. The DCC will be responsible for all end to end communications from the meters at customer properties to users' processing centres.

10.198 In order to fund and support the operation of the national smart meter infrastructure the DCC will levy charges for use of their network. These charges will cover the full end to end process covering the costs of three discrete elements:

- the communication network from the smart meters to the DCC - provided by the Communication Service Provider (CSP);
- internal DCC processing provided by the Data Service Provider (DSP);
- the communication network from the DCC to user's processing centres.

10.199 As at July 2013 an indication of the Communication Service Provider (CSP) element of the charges has been published. This service is to be levied in two distinct categories. Firstly "Fixed" costs based upon the number of meters and secondly, "Variable" costs based upon the number of transactions processed per period by the user. These charges are:

- Fixed cost of £0.20 per electricity meter enrolled per year;
- Variable cost (£ per transaction sent/received) varying from £0.002 to £0.20.

10.200 These charges are under review and are likely to change following contract award in August 2013. Further information is also awaited on the cost of all other elements of the DCC service.

10.201 The following table summarises the DCC fees and costs:

Smart meter related DCC expenditure in RIIO-ED1 (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DCC licence fee	2.4	2.4	1.2	2.0	8.0
DCC fixed transaction costs	5.4	5.7	2.6	3.9	17.6
DCC variable costs	1.0	1.1	0.5	0.6	3.2

Development of WPD smart meter IT systems

10.202 WPD systems for communicating with the DCC and storing smart meter data will be developed by 2015. Additional systems will need to be developed during RIIO-ED1 for the migration of supplier registration processing away from DNO systems to the DCC and for the ability to carry out load management. The cost of these new systems is shown below:

Smart meter IT related expenditure in RIIO-ED1 (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
IT systems	2.2	2.2	1.1	1.8	7.3

Closely associated indirects (engineering management)

10.203 The expenditure on physically carrying out the work could not go ahead without the support of other 'indirect' activities such as planning, project management, system records, stores and transport. Many of the costs have reduced from DPCR5 levels as a result of efficiency savings following acquisition of the Midlands businesses.

Network design and engineering

10.204 Network Design and Engineering activity includes high level planning and detailed project design up to the point of project approval. These costs are forecast to flex in line with work volumes as shown in the table below:

Network design and engineering expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	5.4	5.5	2.6	3.3	16.8
RIIO-ED1 Annual Average	4.4	4.3	2.1	3.0	13.8
RIIO-ED1 Total (8 years)	34.9	34.3	16.5	24.3	110.0

Project management

10.205 Project Management follows on from project approval and relates to the activity of managing the delivery of network projects including work preparation, managing construction of the work and updating all records. Again the costs will flex in line with work volumes as shown in the table below:

Project management expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	5.6	5.9	3.0	4.3	18.8
RIIO-ED1 Annual Average	6.4	6.2	3.1	4.9	20.6
RIIO-ED1 Total (8 years)	51.5	49.5	24.6	39.4	165.0

System mapping

10.206 System Mapping is the activity of updating network geographical records. Although the volume of record updating will change as a consequence of network investment many of the costs, such as payment of Ordnance Survey licence fees are fixed, so it is forecast that costs will remain flat with any increases in volumes being managed through efficiency savings as shown in the table below:

System mapping expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	1.6	1.5	0.7	1.1	4.9
RIIO-ED1 Annual Average	1.4	1.4	0.7	1.2	4.8
RIIO-ED1 Total (8 years)	11.4	11.6	5.7	9.4	38.0

Engineering management and clerical support

10.207 Engineering management and clerical support (EMCS) relates to a wide range of office based activities of managing or assisting employees undertaking direct activities, but not directly involved with either planning projects or project managing. EMCS includes engineering managers, work programmers, resource planners and clerical staff. Some slight increases will be incurred to reflect increases in wayleave payments where an additional £56m will be required over the RIIO-ED1 period. EMCS costs are shown in the table below:

Engineering management and clerical support expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	20.9	20.8	7.9	10.3	59.9
RIIO-ED1 Annual Average	15.3	15.8	8.1	10.7	50.0
RIIO-ED1 Total (8 years)	122.7	126.5	64.8	85.8	399.7

Control centre

10.208 Control centre activities include the real time operational control and monitoring of the network, outage planning and dispatching resources in response to network faults and safety issues. The number of control rooms will be reduced from three to two and this consolidation will take place during 2013. There will then be two control centres, one serving the Midlands and once serving the South West and South Wales. No further changes are proposed during RIIO-ED1 and therefore once the new structure is established costs will remain fixed and are shown in the table below:

Control centre expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	4.4	4.4	2.2	3.1	14.1
RIIO-ED1 Annual Average	4.0	4.2	2.3	3.3	13.8
RIIO-ED1 Total (8 years)	32.2	33.2	18.2	26.4	110.0

Contact centre (call centre)

10.209 It is important for WPD's 7.8 million customers to have the means to contact the company easily. The WPD contact centres manage the main incoming telephone lines used by customers, taking the initial calls, recording details, providing information and forwarding customers on to the relevant parts of the organisation. There are no anticipated future savings from smart meters providing outage information, because staff will continue to contact customers to confirm that they are off supply. There will be an additional cost of around £0.5m per annum for the provision of additional social obligation services, such as a dedicated team for the validation of Priority Services Register data. Contact centre costs are shown in the table below:

Contactcentre expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	1.4	1.4	0.7	1.1	4.6
RIIO-ED1 Annual Average	1.4	1.4	0.7	1.1	4.5
RIIO-ED1 Total (8 years)	10.9	10.9	5.5	9.0	36.3

Stores

10.210 The WPD network investment programme requires a large throughput of materials that are held in local satellite stores supplied from two central warehouses. Supporting the stores activity are storekeepers, stock checkers and delivery drivers. Cost forecasts are assumed to be flat taking account of the savings achieved following the acquisition of the West Midlands and East Midlands businesses.

Stores expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	3.9	4.0	1.3	1.9	11.0
RIIO-ED1 Annual Average	2.6	2.5	1.3	2.1	8.5
RIIO-ED1 Total (8 years)	20.5	20.4	10.3	16.8	68.0

Network policy

10.211 Network policy relates to the development and review of environmental, technical and engineering policies that dictate what is done and the procedures to follow in doing so. During RIIO-ED1 new policies will be needed to reflect the learning of the LCNF and Network Innovation Competition. It is anticipated that the research work and trials will provide the majority of the development of the details and therefore the impact on the Policy Team resources will be limited. It is therefore forecast that current levels of expenditure will continue, as shown in the table below:

Network policy expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	0.9	0.8	0.3	0.4	2.4
RIIO-ED1 Annual Average	0.6	0.6	0.3	0.5	1.8
RIIO-ED1 Total (8 years)	4.4	4.5	2.2	3.6	14.8

Operational training (workforce renewal)

Introduction

- 10.212** Working and operating on the electricity network requires a strong awareness of potential dangers. Staff need to be trained and competent to undertake the required activities following prescribed procedures.
- 10.213** In addition to the specific training received when staff first join WPD, the introduction of new equipment or revised procedures requires that we also provide regular updates and refresher training to our staff.
- 10.214** As staff change roles their responsibilities change and additional operational and upskill training may be required to allow them to fulfill a wider range of responsibilities.
- 10.215** The costs of attending training courses and the provision of trainers, course material and training centres are therefore dependent upon the level of recruitment and the need for refresher and upskill training.

Drivers of workforce renewal

- 10.216** We need to be able to forecast the workforce renewal requirements and training needs to ensure that we have the correct level of resource and expertise in future years.
- 10.217** Workforce renewal is required to replace staff who retire or staff that leave the employment of WPD for other reasons (commonly referred to as 'natural wastage'). It includes the upskill training of existing operational staff for more complex roles.
- 10.218** In addition we need to constantly review our forward work programmes to ensure we are prepared for major changes in the type or volumes of work we are required to undertake.
- 10.219** WPD continually assesses a forward plan for recruitment and training to ensure that staff resource numbers are appropriate for the roles that the business requires.
- 10.220** Early action is taken so that the business has the required number and mix of resources to deliver its plans now and into the future.

Current workforce renewal

- 10.221** WPD currently recruits on average 190 new engineering staff per year to ensure that we have the required resources needed in DPCR5. The staff are normally recruited as apprentices (100 per annum), students/graduates (10 per annum) or as new skills trainees (80 per annum).
- 10.222** In addition we undertake upskill training for around 80 staff per year.

Planning for RIIO-ED1

10.223 WPD staff resource planning looks through both RIIO-ED1 and into the early years of RIIO-ED2 (in particular 2023/24/25). This is to ensure that we recruit sufficient numbers of new staff through RIIO-ED1 and train them such that we have the right number and mix of craft and technical skills for RIIO-ED1 and into the early years of RIIO-ED2.

10.224 In addition to specific changes in workload volumes (which are discussed later) there are two key sources of data that are regularly reviewed in respect of workforce numbers:

- the forward age profile of staff across our business and the skill sets that they possess (allowing the future anticipated number of retirees to be assessed);
- the long run average number of staff that have left WPD through natural wastage with any forward adjustment for significant known events e.g. an “Olympic Park” type development. (At this stage we do not anticipate any major change in our natural wastage numbers going forward and the line is therefore flat throughout RIIO-ED1).

10.225 These requirements are combined to establish the staff resource requirement and are used to feed into our recruitment and training plans.

10.226 In total we need to recruit and train 210 staff per annum (1,680 staff through the RIIO-ED1 period) to allow us to maintain our current DPCR5 staff numbers. As we currently recruit and train 190 staff per year in DPCR5 this represents a small additional replacement need of 20 staff per year (or 160 staff through the RIIO-ED1 period).

10.227 To meet this additional need through RIIO-ED1 and into RIIO-ED2 we plan to increase our recruitment of apprentices from 100 to 120 per annum.

10.228 In addition to these apprentices we will also continue to recruit and train a further 80 new skills trainees each year to replace the average number of people who leave the business through natural wastage.

10.229 Through DPCR5 we have provided upskill training to an average of 80 staff per year (predominantly training craft staff to technician or technician to specialist/team manager roles). This number will remain constant throughout RIIO-ED1.

10.230 Our graduate recruitment will continue at the same rate as that in DPCR5 at around 10 per annum.

10.231 All of these staff will be trained in the skills sets as appropriate for replacing those who have left or who are forecast to leave WPD.

Workload volumes for the WPD ‘Best View’ scenario

10.232 The analysis of asset replacement, general network reinforcement and LCT reinforcement required during RIIO-ED1 combined with the relatively small impact of smart metering results in a resource demand that remains broadly in line with our existing requirements for delivery of our work programme for DPCR5.

10.233 With respect to phasing of work, whilst towards the latter years of RIIO-ED1 the LCT workload shows some increase this coincides with the completion of the ESQCR works required to ensure horizontal safety clearances to buildings.

10.234 This ESQCR work will be completed in WPD South Wales and in both the WPD Midlands licence areas in 2015 and in WPD South West in 2018. Resources that become available from the ESQCR works can be readily deployed to meet increased LCT workload or other programmes as appropriate with minor geographical adjustments made to replace staff following retirements or natural wastage as necessary to meet specific work demands.

10.235 It should also be noted that the level of upskill training also remains broadly flat through RIIO-ED1 and in line with the DPCR5 period.

Impact on training facilities

10.236 WPD owns and operates two main training centres, in Taunton and Tipton, supported by a number of satellite training facilities.

10.237 We currently employ 32 full time trainers. In addition to undertaking new starter training these staff also conduct refresher training, course development, audits and other training activity.

10.238 Under the WPD best view scenario no changes are required to these facilities or trainer numbers.

Summary

10.239 We have detailed the need to increase our annual recruitment from 190 staff per annum to 210 representing an increase of 160 in total over the 8 years of RIIO-ED1. Further details are contained within the Supplementary Annex (SA-05) Expenditure.

Operational training expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	4.6	4.9	4.4	6.4	20.3
RIIO-ED1 Annual Average	6.0	6.0	4.4	5.9	22.2
RIIO-ED1 Total (8 years)	47.8	47.7	35.3	46.8	177.5

Business support costs (corporate activities)

10.240 Corporate activities (also referred to as business support indirects) include a number of central functions provided for all licence areas. Corporate costs are generally allocated broadly on the basis of network scale on a 30:30:15:25 ratio between West Midlands, East Midlands, South Wales and South West respectively.

Human resources and non-operational training

10.241 Expenditure on the human resources function includes development of HR policy and procedures, employee relations, payroll management, and the costs for non-operational training include the preparation and provision of non-engineering training courses. There are no major changes to expenditure and demonstrated in the table below:

Human resources and non-operational training expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	1.4	1.2	0.6	0.8	3.9
RIIO-ED1 Annual Average	0.8	0.8	0.4	0.6	2.6
RIIO-ED1 Total (8 years)	6.1	6.2	3.6	5.0	20.9

Finance and regulation

10.242 Finance and regulation expenditure covers a wide range of activities including the statutory, regulatory and internal management of cost, procurement, insurance, taxation and auditing activities. Although the scale of regulatory reporting has grown, WPD has implemented data analysis software (Hyperion) to make the extraction of data and population of reporting templates less labour intensive, faster and more auditable. This means that as the burden of regulatory reporting increases, the impact on resource requirements is minimised.

10.243 Ofgem is proposing to change licence conditions for illegal abstractions of electricity, introducing a new obligation for DNOs to investigate where a supplier is not registered at a property. When this is implemented, WPD will incur additional costs but these are not expected to be material.

10.244 Finance and regulation expenditure is shown in the table below:

Finance and regulation expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	7.4	6.7	4.4	7.0	25.5
RIIO-ED1 Annual Average	7.9	7.2	4.5	7.2	26.8
RIIO-ED1 Total (8 years)	62.9	57.9	35.7	57.9	214.4

CEO and corporate communications

10.245 The costs classed under CEO include the cost of directors, board meeting costs, corporate communications, community awareness, legal services and company secretarial. WPD will continue to raise awareness of its activities through an annual publication sent to all customers supported by a month long TV campaign. Additional activities will be carried out for communication of services for vulnerable customers and will cost an extra £0.5m per annum.

CEO and corporate communications expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	2.0	2.2	1.3	2.2	7.7
RIIO-ED1 Annual Average	2.3	2.4	1.0	1.6	7.2
RIIO-ED1 Total (8 years)	18.0	19.0	8.0	12.9	57.9

Vehicles, IT, property and engineering equipment

10.246 Non-operational capital relates to expenditure on new and replacement assets that are not network assets. During RIIO-ED1, WPD will refurbish some existing offices and purchase new operational vehicles, tools and IT systems.

Vehicle leases, maintenance and servicing

10.247 Historically in the West Midlands and East Midlands vehicles have been leased and maintenance has been contracted out to third parties, but in South Wales and South West vehicles have been purchased and maintained with in-house facilities, providing a dedicated, faster and more cost effective service. Vehicles in the Midlands will be progressively replaced with purchased items as the leases expire; this means that there will be a migration of costs from vehicle leases to vehicle purchase during RIIO-ED1.

Vehicle leases, maintenance and servicing expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	9.6	8.9	3.9	6.1	28.6
RIIO-ED1 Annual Average	4.3	3.3	2.2	3.7	13.4
RIIO-ED1 Total (8 years)	34.1	26.2	17.2	29.9	107.5

Vehicle purchases

10.248 During DPCR5 and RIIO-ED1 vehicles in the Midlands will be progressively replaced with purchased items as the leases expire; this means that there will be a migration of costs from vehicle leases to vehicle purchase during RIIO-ED1.

10.249 The decision to purchase rather than lease vehicles was taken because purchasing is justified by the cost benefit analysis (included at Supplementary Annex SA-05 Expenditure).

10.250 The table below shows the cost of vehicle purchases:

Vehicle purchase expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	4.4	3.9	1.2	2.1	11.7
RIIO-ED1 Annual Average	3.8	2.9	1.9	3.3	11.9
RIIO-ED1 Total (8 years)	30.3	23.3	15.2	26.3	95.2

Running costs for existing IT and telecoms

10.251 WPD's business support costs for IT and telecoms cover costs of system maintenance and administration, software licence fees and communication costs. Although savings have been made as part of the acquisition of the Midlands businesses, IT systems continually evolve and technological developments enhance system capability. There will be on-going costs for software licences and our forecast assumes that these costs will rise as more flexible mobile working arrangements are implemented and use of business intelligence tools increases.

Existing IT and telecoms expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	11.2	10.7	5.2	8.2	35.3
RIIO-ED1 Annual Average	9.9	9.9	5.0	8.2	32.9
RIIO-ED1 Total (8 years)	78.9	78.9	39.8	65.4	263.0

Capital purchase of IT&T

10.252 Reliable computer and telecoms infrastructure is critical in order to allow staff to carry out their duties. During RIIO-ED1 we will be making improvements to both IT and telecoms systems.

10.253 The evolution of computer systems brings improvements in functionality and faster processing of data. Servers, computers and printers are refreshed every 4-5 years to ensure devices remain reliable and take advantage of developments in technology.

10.254 The introduction of more mobile working throughout the company will lead to increased use of laptops and handheld devices for data collection and management of work.

10.255 The data communications network will be updated to meet the demand for an increasingly resilient, reliable, high bandwidth, low latency network to meet business needs for high volumes of data traffic - driven by smart metering, smart grids, mapping data, scanned images, graphics, pictures and video.

10.256 Modern telephony networks are predominantly operated using internet protocols allowing data and voice calls to use the same network. The system used in the South Wales and South West uses an older digital exchange and will therefore be converted to internet protocol in RIIO-ED1.

10.257 The implementation of in-house developed systems will only be considered when 'off the shelf' solutions are not available to meet business needs or where WPD can gain business advantage by building a tailor-made system. This approach allows systems to be quickly updated with additional functionality to cater for new outputs, measures and performance indicators.

IT & telecoms non-operational capital expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	2.8	2.6	1.9	3.1	10.4
RIIO-ED1 Annual Average	4.2	4.2	2.1	3.5	14.1
RIIO-ED1 Total (8 years)	33.9	33.9	17.1	27.8	112.6

Property management and maintenance

10.258 There are 59 non-operational properties throughout the region that are used to provide office space and parking for local teams. Having established more depots in the Midlands, there are no plans to significantly change the portfolio of property and therefore costs for rent, security, routine maintenance and cleaning are forecast in line with current levels of expenditure.

Property management and maintenance expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	4.8	5.6	2.1	3.4	15.8
RIIO-ED1 Annual Average	4.2	5.6	2.0	3.5	15.3
RIIO-ED1 Total (8 years)	33.6	44.6	16.2	28.0	122.3

Purchase and refurbishment of non-operational property

10.259 Non-operational property costs relate to premises used by people (e.g. depots and offices). There are no plans to purchase any new properties, but £2m per annum will be spent on improvements and refurbishments to buildings that have not been refurbished for over 10 years. The majority of expenditure will be in the South West where most of the older unrefurbished properties are.

Non-operational property expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	0.9	1.2	1.0	1.1	4.3
RIIO-ED1 Annual Average	0.4	0.4	0.3	0.7	1.8
RIIO-ED1 Total (8 years)	3.4	3.3	2.3	5.4	14.3

Tools and equipment

10.260 Craft and engineering staff require equipment to work on the network assets. The amount of tools and equipment used for work on the network varies in proportion to direct network costs and so the costs have been rolled forward in proportion to the changes in the work programme as shown in the table below:

Tools and equipment expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	2.8	3.3	1.7	2.0	9.8
RIIO-ED1 Annual Average	2.9	2.9	1.6	2.4	9.7
RIIO-ED1 Total (8 years)	22.9	22.9	12.6	19.0	77.4

Transmission exit charges

- 10.261** The WPD network is connected to the National Grid at Transmission Exit Points. National Grid provides infrastructure at these exit points to allow power to flow from the transmission system to the distribution network. National Grid recovers the cost of providing the exit points through annual charges.
- 10.262** The charges include the costs for new assets when additional capacity is requested by WPD. The costs of replacing existing assets is determined by National Grid's replacement programme and are charged to WPD over a forty year period.
- 10.263** Where additional capacity is required, WPD's preference is to reinforce the distribution network as it is usually cheaper. Inevitably there are circumstances where it is necessary to request additional capacity from National Grid. WPD works closely with National Grid at Joint Technical Planning Meetings to determine which approach to reinforcement is the most economical.
- 10.264** Even though National Grid provide a quotation for the proposed work, the eventual charges are determined by the actual costs of the work. This means that if additional costs are incurred they are passed through to the charges levied on WPD. Hence there is little opportunity to influence the costs once projects are under way.
- 10.265** During RIIO-ED1 there will be limited requirement for new or reinforced transmission exit charges and this will add only £0.4m per annum to charges. The majority of costs cover previous requirements and National Grid's replacement programme. The following expenditure relates to pass through costs.

Transmission exit charges – pass through costs (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	9.8	7.1	5.1	6.5	28.5
RIIO-ED1 Annual Average	13.5	11.6	8.6	9.0	42.7
RIIO-ED1 Total (8 years)	107.9	92.7	68.7	71.6	340.9

Business rates

10.266 Rates are a tax on the occupation of property. They are based on the rental value of the property set by the Valuation Office, an executive agency of the Inland Revenue. Rates are calculated by rateable value multiplied by the uniform business rate, which is set by Central Government.

10.267 We have assumed that the next revaluation to set rateable values will take effect in England and Wales on 1 April 2017, and that rates will increase in line with projected RAV increases. We have also assumed that the same transitional relief mechanism (that only exists in England) will apply as for the 2010 revaluation i.e. first year cap of 12.5% increase, second year 17.5% and third year 20%.

10.268 The net impact of the assumptions above is to increase business rates by 17%. The total costs for the RIIO-ED1 period are broken down by DNO as follows:

Business rates (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	28.1	35.6	16.3	19.1	99.1
RIIO-ED1 Annual Average	34.5	45.3	18.1	18.3	116.2
RIIO-ED1 Total (8 years)	276.0	362.7	144.8	146.4	929.9

10.269 As was the case in previous revaluations WPD will do its best to engage with Valuation Office so as to ensure that business rate charges made on the four WPD DNOs are minimised.

Ofgem licence costs

10.270 Ofgem licence fees are calculated for the year ahead based upon an estimate of Ofgem's net costs plus an amount for Consumer Focus and Consumer Direct/The Office of Fair Trading. These are allocated across licence holders in proportion to the number of customers.

10.271 Fees are assumed to remain at the same level as in DPCR5. In 2012/13 licences fees for the four WPD licence areas were £3.8m.

Pensions

10.272 Pension costs are excluded from the various categories of costs in other parts of this plan because pension recovery rates can vary and so distort cost comparisons between years.

Background

10.273 There are two types of pension scheme:

- Final Salary Schemes that provide a pension to employees based on their salary at the time they retire (or leave employment if that is earlier) and their years of service;
- Defined Contribution Schemes that provide a pension that depends on how much was paid into the scheme by the employee and employer.

10.274 Final salary schemes need to be funded on the basis of estimates of the value of investments held by the scheme (the assets) and the projected pension costs (the liabilities). Both the assets and liabilities vary over time and full valuations are carried out every three years. If the assets are worth more than the estimate of the liabilities, there is a surplus. If the assets are worth less than the liabilities, there is a deficit.

10.275 When there is a deficit, companies have a legal obligation to pay in enough money over time to ensure that the deficit is eliminated. The period over which the deficit is eliminated is the deficit recovery period and is assumed to be over 10 years from 1st April 2014.

10.276 By their nature, defined contribution schemes can have neither a surplus nor a deficit.

10.277 Pensions matters are overseen by the Pensions Regulator who ensures that companies meet their obligations to the pensions schemes under both the pension scheme trust deeds and the Pensions Act.

WPD pension schemes

10.278 WPD operates two final salary schemes, the WPD Electricity Supply Pension Scheme (WPD ESPS) for employees and former employees of South West and South Wales; and the CN Electricity Supply Pension Scheme (CN ESPS) for employees and former employees of East Midlands and West Midlands.

10.279 Both of WPD's final salary schemes are closed to new members, but 72.5% of current employees are included within the final salary schemes.

10.280 WPD also operates a defined contribution (DC) scheme the Western Power Pension Scheme (WPPS) for employees that joined WPD after the final salary schemes were closed to new members. 27.5% of current employees are members of the DC scheme.

Defined contribution scheme pension costs

10.281 Under Ofgem’s pension funding principles that were reaffirmed in 2012, costs related to defined contribution schemes receive a separate allowance. The defined contribution pension costs included in our plan are set out below:

Defined contribution scheme pension expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	0.7	0.8	0.2	0.4	2.1
RIIO-ED1 Annual Average	2.1	2.1	0.7	1.0	5.9
RIIO-ED1 Total (8 years)	16.9	16.9	5.2	8.3	47.3

Final salary schemes – ongoing costs

10.282 Employees accrue pension rights as they work, and they contribute to the costs of funding those pensions by paying a percentage of their salaries into the scheme.

10.283 WPD also helps fund the pension scheme. Following a valuation in 2011, for staff in the Midlands we currently pay an average standard contribution rate (SCR) of 22.4% of employees’ salaries into the CN ESPS, while for South West and South Wales we pay an SCR of 24% of salaries into the WPD ESPS. These percentages (which exclude administrative costs and Pension Protection Fund levy costs) are in line with those paid by other DNOs and are less than those paid by GDNs as demonstrated by the table below:

Employer SCR (% of pay as at 31 March 2010) (Source GAD Report for Ofgem dated 16 May 2012)	
Scotia Gas Networks	43%
Scottish Hydro	42%
Northern Gas Networks	34%
National Grid Gas	32%
Electricity North West	29%
Central Networks East and West (pre 2011)	28%
Northern Power Grid	27%
UK Power Networks	26%
Scottish and Southern (Southern)	26%
SP Manweb	25%
Scottish Power	24%
National Grid Electricity	24%
WPD South West and South Wales	24%

10.284 The projected ongoing pension costs from April 2015 onwards are included in our plan are set out below:

Ongoing final salary pension expenditure (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	10.4	9.8	7.4	11.9	39.5
RIIO-ED1 Annual Average	8.5	8.5	7.1	11.3	35.4
RIIO-ED1 Total (8 years)	67.8	67.6	57.1	90.5	283.0

Final salary schemes – deficit contributions

- 10.285** Both the CN ESPS and the WPD ESPS are anticipated to have deficits at the next valuation date (31 March 2013).
- 10.286** The amount of deficit contributions needed changes with the value of the deficit and is determined in negotiation with the pension schemes' trustees every three years. The deficit changes with movements in financial markets, the level of contributions, membership changes and other assumptions (e.g. future interest rates) made by the actuaries when they estimate future cost of paying the pensions. During RIIO-ED1 valuations will take place based on the values as at 31 March 2016, 2019 and 2022.
- 10.287** Both the CN ESPS and the WPD ESPS include pensioners and former employees not yet drawing a pension that worked for parts of the wider WPD business outside of the main distribution business. Therefore, not all the pension deficit relates to the DNOs. Ofgem has therefore undertaken to provide an allowance only for an estimated 76.4% (for WPD ESPS) and 80.1% (for CN ESPS) of the revalued 2010 deficit provided that the deficit costs are determined as not being inefficient. Whether or not such costs are efficient will be determined by Ofgem on the basis of an independent reasonableness review to be commissioned by Ofgem.
- 10.288** In their restated pension principles, Ofgem have undertaken to give companies an allowance to pay the regulated 'distribution' portion of the deficits at 31 March 2010. No specific allowance is available for any deficit that is created after 31 March 2010 although the costs of any such incremental deficit relating to regulated activities will be allowed as part of overall employment costs. However, because of investment market changes, and changes in estimates of how long pensions are due to be paid, the March 2010 deficit is revalued from time to time.
- 10.289** Our forecast of pension costs for the defined benefit schemes is based on the most recent actuarial valuations (WPD Group 31st March 2010 and Central Networks Group 30th June 2011), projected forward to 31st December 2012 based on market conditions (including the latest mortality statistics) as at 31st January 2013.
- 10.290** The projected deficits based on independent actuaries' estimates for our two schemes at 31st December 2012 are:
- WPD Group £893m (of which £881m is 31 March 2010 deficit)
 - Central Networks Group £577m (of which £570m is 31 March 2010 deficit).
- 10.291** After the submission of WPD's Business Plan in June 2013, Ofgem applied an adjustment to the RIIO-ED1 Pension Deficit Repair Allowance included in our plan. The effect of this was to reduce the Pensions Deficit Repair Allowance for the RIIO-ED1 period by a total of approximately £117m across all four WPD DNOs. The intention of this adjustment was to reflect not only the provisional DPCR5 adjustments but also certain other adjustments proposed by Ofgem and agreed in August 2013 on the basis that they would be subject to the 2013 valuation and pension review originally intended to be conducted by Ofgem prior to the commencement of the RIIO-ED1 price control.
- 10.292** It should be noted that any differences between this adjusted forecast and the allowances based on the outcome of the actual 2013 triennial valuations, subject to Ofgem's reasonableness review, will be taken into account through the Annual Iteration Process as set out in the RIIO-ED1 Strategy Decision Documents. This provides an opportunity for Pensions Deficit Repair Allowances to be reset for the years 2016/17 onwards.

10.293 The pension deficit allowances included in our plan relating to the deficits referred to above are set out in the table below:

Pension deficit repair expenditure funded through DUoS (£m)					
	West Midlands	East Midlands	South Wales	South West	WPD Total
DPCR5 Annual Average	19.4	17.9	13.2	23.4	73.9
RIIO-ED1 Annual Average	19.6	19.2	22.2	35.9	96.9
RIIO-ED1 Total (8 years)	156.8	153.9	178.0	287.6	776.3
Legacy Adjustments	8.9	9.4	-5.1	-6.3	6.9
RIIO-ED1 Total (8 years) inc. Legacy	165.7	163.3	172.9	281.3	783.1

Real price effects

10.294 WPD has engaged First Economics to assess real price effects (i.e. above inflation costs) and the findings are shown in the table below:

Real price effects (%)						
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19 to 2022/23
Labour – general	(0.6)	0.2	0.7	0.5	0.2	0.9
Labour – specialist	0.7	1.5	2.0	1.8	1.5	2.1
Materials – general/civils	0.7	1.7	1.3	1.0	0.8	1.1
Materials – electrical	0.2	2.2	1.8	1.5	1.3	1.6
Plant and equipment	0.2	1.2	0.8	0.5	0.3	0.6
IT	(2.1)	(2.1)	(2.5)	(2.8)	(3.0)	(2.7)
Property rentals	(0.6)	0.2	0.7	0.5	0.2	0.9

10.295 The forecast has been derived from a number of data sources including the Office for National Statistics and the Office for Budget Responsibility.

10.296 The forecasts costs for specific activities in the Business Plan have not included the effects of these above inflation costs. Their impact is accounted separately and offset, in part, by efficiency savings.

Regional drivers

10.297 WPD operates across a wide geographic area including large cities like Birmingham and Bristol, Cardiff and Nottingham and sparsely populated rural areas in Lincolnshire, Cornwall and South Wales.

10.298 Each location has its unique challenges but does not necessitate any specific locational or regional adjustments.

10.299 The only location where we agree there should be an allowance for regional effects is inner London.

Efficiency improvements

10.300 We have sought to identify the scope for year on year efficiency improvements. We have considered efficiency improvements in three component parts, they are:

- efficiency catch up, which relates to the opportunity for an inefficient DNO to improve its efficiency to a level consistent with the most efficient DNO;
- merger efficiencies, which relate to the cost saving delivered as a consequence of merger and acquisition activity;
- frontier efficiency shift, which relates to the on-going efficiency improvements that can be delivered by a DNO already operating at the efficiency frontier.

10.301 WPD has been identified as one of the most efficient DNOs. Therefore there is negligible scope associated with catch up efficiency.

10.302 The synergy and efficiency savings that have been delivered following WPD's acquisition of the West and East Midlands DNOs have been identified in this Business Plan. Therefore, there is no further scope for additional merger efficiencies.

10.303 However, our review of available information indicates that there is scope for year on year improvements available to WPD as a frontier performing DNO. Our Business Plan assumes that efficiency savings of 1% per year will be achieved for controllable cost elements of labour, materials and contractor costs.

Business efficiency improvement (%)								
	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Labour	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Materials	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Contractors	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

10.304 This 1% per year efficiency saving does not relate to any specific initiatives. However, the generic initiatives that we seek to exploit include:

- improvements to business processes;
- improvements to operational working practices;
- new innovative techniques developed as part of LCNF projects;
- learning from other DNOs, utilities and large asset based organisations;
- reductions in the cost of procured goods and services;
- continued use of in-house resource to undertake core activities;
- design of the right engineering solutions to network problems (i.e. no 'gold plating').

10.305 A copy of the First Economics report is available at <http://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Supporting-Expenditure-information/First-Economics-RPE-forecast.aspx>

Traffic Management Act – impact of Permit Schemes

10.306 Legislation requires WPD to inform Highways Authorities about work that will affect public roads. This helps the authorities to manage the road network and where possible co-ordinate work with other utilities to minimise disruption to traffic and the effect on economic growth.

10.307 There are three different types of notification scheme in operation:

- Notices describe the work location, when the work will take place and how long it will take. They are the main method for notification and do not require any payment. Unless the Highways Authority objects, the work can go ahead as notified.
- Permits are similar to Notices, with the main differences being that the Highways Authority will grant permission or refuse permission based upon assessment of the submitted permit and that charges can be levied. The Department for Transport is actively encouraging Highway Authorities to implement Permit Schemes, specifically for strategic traffic routes.
- Lane Rental is a scheme where Highway Authorities charge a daily fee for access to work in the highway. These can only be implemented once an Authority has operated a Permit Scheme for at least two years. Consequently only a limited number of authorities have currently either implemented or are seeking to implement a Lane Rental scheme. However, over the RIIO-ED1 period it is envisaged that more authorities will implement them and that there could be a significant impact on costs.

10.308 Although there are currently four Permit Schemes operating within the WPD area, consultation with all the Highways Authorities has identified that several of them (particularly in West Midlands and East Midlands) will be seeking to develop permit schemes some of which are at advanced stages of implementation.

10.309 The introduction of these schemes will lead to costs that WPD cannot avoid, but the impact is not certain because the timing and scale of each scheme is determined by individual Highways Authorities. Additional annual costs have been forecast by considering the amount of work carried out on traffic sensitive roads and the typical costs of permits for different activities. These costs are normally incorporated within direct work activities but they are shown separately below to illustrate their impact on the business.

Licence area	Permit fee annual cost (£m)
West Midlands	0.37
East Midlands	0.45
South Wales	0.12*
South West	0.14

* South Wales permit costs would not be incurred until half way through RIIO-ED1, once the Welsh Assembly had determined their strategy.

10.310 The timing of Lane Rental schemes is unknown, but should they be introduced, WPD will incur additional multi-million pound costs each year. Due to the great uncertainty, WPD has not proposed any cost allowances in RIIO-ED1, but will require a price control re-opener mechanism to be in place should the introduction of Lane Rental schemes have a material impact on expenditure.

10.311 The costs indicated in this section have been incorporated into the costs of direct activities.

11 Uncertainty

11.1 The proposals in this Business Plan have been derived by using the most up-to-date information that is available and therefore represents WPD's best view. Although we are best placed to manage the risk of delivery of our plan, there are some areas of uncertainty which need additional mechanisms due to the external nature of the uncertainty and its potential impact.

11.2 In assessing the need for uncertainty mechanisms we consider:

- the reason for introducing each one;
- the appropriate mechanism;
- the value and impact on customers and other stakeholders;
- whether the proposed mechanism works with other aspects of the plan.

11.3 We also consider whether there are any drawbacks in terms of :

- undermining efficient delivery;
- price volatility;
- unintended consequences;
- complexity;
- resource cost to manage (both internal and at Ofgem).

11.4 The areas of uncertainty that meet these criteria are:

- load related expenditure (including uptake of low carbon technology);
- potential introduction of Lane Rental charges for works in the street;
- impact of the smart meter rollout;
- CNI security;
- innovation rollout.

Load related expenditure

11.5 The external drivers of investment due to changes in the demand on our network are:

- General economic conditions which has a significant influence on new connections;
- Customer behaviour in terms of energy efficiency and their usage in response to overall prices and tariffs introduced by suppliers;
- Rate of adoption of LCTs;
- Connection of DG which is heavily influenced by support mechanisms and planning policy.

11.6 The UK targets for reducing carbon dioxide emissions require a reduction of 80% by 2050. This target will be met through the decarbonisation of heating and transport, improvements in energy efficiency and producing electricity from renewable sources. A number of low carbon technologies - such as electric vehicles, solar panels, wind farms and heat pumps - place new requirements on the network.

11.7 As part of its Carbon Plan, DECC has set out 4 illustrative scenarios all of which would meet the Government's carbon targets. These national scenarios, all of which require a significant adoption of LCTs, have been summarised by DECC as follows:

Scenario 1	High emissions abatement in low carbon heat
<ul style="list-style-type: none"> • Medium levels of fuel efficiency • High levels of low carbon heat • High levels of solid wall insulation 	High level of emissions reductions from uptake of low carbon heat in buildings and industry (8 million installations) with significant emission reductions from transport (60g CO ₂ /km) and significant thermal insulation of buildings (5 million solid wall insulation).
Scenario 2	High emissions abatement in transport
<ul style="list-style-type: none"> • High levels of fuel efficiency • Medium levels of low carbon heat • High levels of solid wall insulation 	High level of emissions reductions from transport (50g CO ₂ /km), with comparatively lower reductions from low carbon heat (7 million installations) and significant thermal insulation of buildings (5 million solid wall insulation).
Scenario 3	High electrification of heat and transport
<ul style="list-style-type: none"> • High levels of fuel efficiency • High levels of low carbon heat • Low levels of solid wall insulation 	This reflects a future where there is high electrification in heat and transport, with significant uptake of EVs and heat pumps (as in scenario 1 and scenario 2) and lower comparative levels of insulation (2.5 million).
Scenario 4	Credit purchase
<ul style="list-style-type: none"> • Low levels of fuel efficiency • Low levels of low carbon heat • Medium levels of solid wall insulation 	Reflects a future where more than one key technology under-delivers, and carbon credits are purchased. It assumes 1.6 million low carbon heat installations, medium levels of insulation (4.5 million) and fuel efficiency of 70g CO ₂ /km.

11.8 Although DECC has produced a number of scenarios for meeting the target, there is considerable uncertainty about the uptake of low carbon technology, how installations will cluster and the resultant impact on the network.

11.9 The rate of growth will be dependent on many factors such as development of these technologies by manufacturers, rate of fall of prices, relative cost of different fuels, availability of subsidies, building regulations and consumer attitudes.

11.10 Our expenditure forecasts are based upon pragmatic assumptions informed by data provided by the CSE. We have proposed to use information from more advanced monitoring of the network and data from smart meters to identify LCT hotspots so that reinforcement work can be targeted at the parts of the network where it is required. Tracking expenditure against forecasts will determine whether there is significant variance.

11.11 The need for network reinforcement is dependent on widespread changes in demand driven by general economic conditions and the specific location of the development of new load or generation connections. This is in addition to the effect of LCTs.

- 11.12** Assumptions about the amount of load growth are used to forecast which parts of the network will require reinforcement, but actual load growth can differ.
- 11.13** Ofgem recognises that there is significant uncertainty over the investment required to accommodate new and changing patterns of energy use.
- 11.14** The load-related reopener mechanism introduced for DPCR5 will continue into RIIO-ED1, but with an expanded scope that additionally includes fault level reinforcement and secondary network connections.
- 11.15** The re-opener will operate around a 20% dead band, where efficient costs incurred above the deadband can be funded through additional allowances.
- 11.16** There will be two windows in 2017 and 2020 where DNOs have the opportunity to demonstrate that incurred efficient costs are more than 20% higher than the combined allowances for load related work. At the end of RIIO-ED1 there will not be an opportunity to recover additional costs, even if they exceed the threshold at that point.
- 11.17** WPD is satisfied that the proposal by Ofgem provides the right approach to the level of uncertainty and we require no further mechanism.

High value projects

- 11.18** Sometimes there is a need to carry out extensive work to resolve an issue. This can result in multi-million pound projects. They can be required to accommodate additional demand, which can be as a result of new connection activity.
- 11.19** The move to an eight year price control period means that these high-value projects could arise once allowances have been decided.
- 11.20** We do not expect to have many projects falling within this category and the availability of a reopener adequately covers any future requirements that may arise.

Transmission Connection Point charges

- 11.21** The WPD network is connected to the National Grid at Transmission Connection Points (also referred to as Transmission Exit Points). National Grid provides infrastructure at these exit points to allow power to flow between the transmission system and distribution network.
- 11.22** Even though National Grid provides a quotation for the proposed work, the eventual charges are determined by the actual costs of the work. This means that if additional costs are incurred they are included in the charges levied on WPD. There is little opportunity to influence the costs once projects are under way.
- 11.23** Ofgem proposes to treat part of transmission connection charges as pass through costs. This will apply to assets installed prior to 2015 and any new work resulting from National Grid's assets replacement programme.
- 11.24** The proposed regulatory framework provides a balanced approach to managing cost uncertainty and, by excluding DNO instigated work, places a responsibility on DNOs to identify the most efficient mechanism for providing the additional capacity required at transmission connection points.
- 11.25** We are satisfied that approach by Ofgem is sufficient and we do not require any additional uncertainty mechanism.

Street works

- 11.26** Legislation requires WPD to inform Highways Authorities about work that will affect public roads. Most Highways Authorities currently operate a Notice process which does not incur fees, but the Department for Transport is encouraging them to implement Permit schemes for traffic sensitive strategic roads that will introduce new charges. In addition Highways Authorities have the option of implementing Lane Rental schemes where utilities pay a daily charge for working in the road.
- 11.27** We have assumed that Highway Authorities will adopt Permits schemes, but only apply these to traffic sensitive roads. This will introduce an additional cost of £1m per annum across WPD. This approach balances the additional costs where Highways Authorities choose to apply Permit fees to all roads against situations where Notice schemes remain in place.
- 11.28** Ofgem proposes to have one reopener window in 2019 where additional costs for the full period will be considered. It will cover additional costs associated with Permit Schemes and Lane Rentals, including system set up costs, but these will need to exceed a materiality threshold for the reopener to apply.
- 11.29** WPD actively engages with over 60 local authorities to keep informed of changes to requirements across the company. Since local authorities apply to the Department for Transport to introduce schemes, there is sufficient time to understand the impact of changes. This means that one reopener at the mid-point of RIIO-ED1 will be adequate.

Enhanced physical site security

- 11.30** DECC are responsible for assessing the items of our network which are a part of the Critical National Infrastructure (CNI). The assessment undertaken considers the number of customers connected to a specific site, its criticality to the network in general or its role in supporting key installations or customers. When a site is defined as being part of this list, additional security works are undertaken to increase the protection of the site.
- 11.31** Where additional costs exceed a materiality threshold, DNOs can apply for a reopener in 2019. Cost below the threshold can be logged up and Ofgem will consider them as part of RIIO-ED2 allowances.
- 11.32** The proposals made by Ofgem provide recovery of all efficiently incurred costs. WPD does not require any additional mechanisms.

Smart meter rollout and DCC fixed costs

- 11.33** The roll out of smart meters to domestic customers between the end of 2014 and 2020 has uncertainty in all three main impact areas:
- remedial work at the metering point;
 - charges from the Data and Communications Company for the provision of data from smart meters;
 - development of in-house systems for the receipt and storage of data, the potential for the DCC to start handling the change of supplier registration process and proactive load management system.
- 11.34** The volume and cost of the remedial work included within the Business Plan assumes that 2% of installations will require remedial action to allow the meter operator to install a smart meter. The National Skill Academy has provided forecasts that suggest 4% of installations will require a visit to enable a smart meter to be connected and therefore costs from remedial work could double. Due to the uncertainty of the actual volumes of remedial work it is proposed that a volume driver is required to adjust allowances once the work is completed.
- 11.35** Provisional charges for DCC services, published by DECC in January 2013, suggest that costs for WPD would be approximately £100m over the RIIO-ED1 period. These charges have been reviewed by DECC and figures shared in April 2013 suggest that the costs will be reduced to around £29m. These costs may change again once DECC completes the procurement process to establish the DCC provider.
- 11.36** The in-house data systems for communication with the DCC and for the storage of smart meter data will be completed by the end of 2015, however the design baseline for these systems is yet to be defined. In addition, systems may also be required to enable the DCC to carry out the Change of Supplier Registration Service (a process currently carried out within DNO systems) and there will be a need for systems to carry out load management once the roll out of smart meters near completion. The exact nature of these systems is undefined and therefore there is uncertainty about the costs.
- 11.37** The proposed regulatory framework has two mechanisms; a volume driver for the volume of remedial work required and a pass through for the DCC and system costs.
- 11.38** Suppliers will be installing smart meters at around four times the rate of routine meter changes. This will identify higher volumes than normal for remedial actions required at service positions. The exact impact is uncertain and the use of a volume driver to adjust allowances is appropriate.
- 11.39** DECC has determined that full fixed costs for the DNOs will be levied from the start of the smart meter rollout. Costs will be incurred at a time when there will be insufficient coverage to gain benefits. During the rollout programme, allowances are required for these costs and the use of a pass through approach is acceptable.
- 11.40** Since the specification of the IT and communication systems that DNOs will require to make use of the data are not fully defined the costs are uncertain. Since the specifications will be determined by DECC and the DCC the requirement is outside of the control of DNOs and a pass through mechanism for the costs is acceptable.

Innovation rollout

- 11.41** WPD is carrying out the highest number of Low Carbon Network Fund projects of all DNOs. The rollout of some of these solutions may be directed to providing longer term benefits. This may require investment ahead of the benefits being delivered. Without additional funding these projects may not be able to go ahead.
- 11.42** Ofgem has proposed an innovation rollout mechanism that can be used for costs associated with the implementation of proven low carbon or environmental innovations.
- 11.43** Where the benefits of innovation will materialise in the long term, an application can be made for additional funding should the cost of the rollout exceed a materiality threshold. Costs below the threshold will not be funded, but will be subject to the efficiency incentive.
- 11.44** There will be two windows, in 2017 and 2019, where DNOs can apply for additional funding and application can be made ahead of expenditure being incurred.
- 11.45** The proposals made by Ofgem provide two opportunities to request additional funding. WPD does not require any additional mechanisms.

RPI Indexation

- 11.46** Ofgem proposes to use the Retail Prices Index (RPI) to adjust allowances for economy-wide inflation/deflation.
- 11.47** This principle is established within regulatory mechanisms and we do not propose any changes to it.

Cost of debt

- 11.48** Prior to the introduction of the RIIO framework for price controls, the cost of debt was determined at the start of a price control and fixed for the whole period. The move to longer price control periods has led Ofgem to implement a methodology that varies the costs of debt in line with a published index.
- 11.49** Ofgem proposes to set the real cost of debt using the a 10 year simple trailing average of the iBoxx GBP Non-Financials indices of 10+ years maturity, with credit ratings of broad A and broad BBB, less the implied 10 year gilt inflation break evens published by the Bank of England. The costs of debt will be updated each year.
- 11.50** The proposals made by Ofgem provide an adequate mechanism for calculating a real cost of debt and we do not propose any changes or any additional mechanisms.

Business rates

- 11.51** Business rates are periodically revaluated and the next revaluation is due in 2017. It is anticipated that they will increase significantly, but the actual amounts will be determined by the Valuation Office, an executive agency of the Inland Revenue.
- 11.52** Ofgem proposes to allow business rates to be pass through provided that DNOs can demonstrate they have made efforts to minimise the valuations.
- 11.53** Charges are mostly outside of the influence of WPD and it is appropriate for them to be treated as pass through costs.

Corporation tax

- 11.54** The Government sets corporation tax in response to economic conditions and other financial objectives. The changes are outside of the control of WPD and can occur at any time.
- 11.55** Ofgem proposes to have annual adjustment mechanism where revenues are adjusted if the impact of a tax change exceeds a materiality threshold. This introduces a dead band, of plus or minus one per cent in the rate of mainstream corporation tax, where revenues are not altered if the impact of the tax change does not breach the threshold. Within the dead band DNOs benefit from tax reduction and incur additional costs when taxes increase. Adjustments can increase or decrease revenues and the use of the dead-band shares the impact of tax changes between DNOs and customers.
- 11.56** Ofgem's proposals cater for any changes. WPD does not require any additional mechanisms.

Established pension deficit repair

- 11.57** Final salary pension schemes need to be funded on the basis of estimates of the value of investments held by the scheme (the assets) and the projected pension costs (the liabilities). Both the assets and liabilities vary over time and full valuations are carried out every three years. If the assets are worth more than the estimate of the liabilities, there is a surplus. If the assets are worth less than the liabilities, there is a deficit.
- 11.58** In their restated pension principles, Ofgem have undertaken to give companies an allowance to pay the regulated 'Distribution' portion of the deficits at 31 March 2010. No specific allowance is available for any deficit that is created after 31 March 2010 although the costs of any such incremental deficit relating to regulated activities will be allowed as part of overall employment costs.
- 11.59** Ofgem proposes to have three re-opener windows (in 2016, 2019 and 2022) that coincide with triennial actuarial revaluations. These will be used to assess costs and adjust allowances to reflect economic and efficiently incurred deficit. WPD does not require any additional mechanisms.

Ofgem licence fees

- 11.60** Ofgem funds its activities by charging licence fees. These charges are dependent upon the costs incurred by Ofgem and are outside the control of DNOs. Whilst there is significant development and change in energy provision, there is uncertainty about the scale of Ofgem's activities and it is difficult to determine an appropriate ex-ante allowance.
- 11.61** Ofgem proposes to allow Ofgem licence fees to be treated as pass through and WPD believe that this is appropriate.

12 Financing the Business Plan

- 12.1** The expenditure requirements during RIIO-ED1 will mean that WPD will have to raise £1.74bn of new debt as well as re-financing £850m debt as it falls due for repayment. In addition shareholders will re-invest £874m to maintain gearing at 65% (debt to RAV value).
- 12.2** In deriving these values we have made a number of assumptions about the cost of debt, cost of equity and other financing parameters.

Cost of equity - 6.4%

- 12.3** The lengthening of the price control period from five years in DPCR5 to eight years in RIIO-ED1 increases forecasting risk for WPD's shareholder. Forecasting the level of costs is less certain for eight years and this uncertainty is compounded by investment requirement uncertainty (for example for the range of scenarios for LCTs). However, Ofgem have indicated that they intend to put in sufficient cost re-opener mechanisms in RIIO-ED1 to off-set the increased forecasting risk.
- 12.4** Our cost of equity assumption is in line with the value specified in the Ofgem's Decision to fast track Western Power Distribution document, namely 6.4%.

Cost of debt - 2.6%

- 12.5** Ofgem has determined that under RIIO-ED1 the cost of debt will be calculated from a 10 year rolling average of real rates that will be determined from the arithmetical average of the iBoxx A-rated and BBB-rated non-financial indices less the implied 10-year gilt inflation break evens published daily by the Bank of England. We estimate that the average cost of debt allowance over RIIO-ED1 will be 2.3% and we have used this figure in testing the financeability of the plan.
- 12.6** To enable comparability between DNOs Business Plans Ofgem have indicated that we should use the value specified in the Ofgem's Decision to fast track Western Power Distribution document, namely 2.6%. We have utilised this figure within each year of the RIIO-ED1 finance plan to produce the forecast figures.

RIIO-ED1 Cost of Debt Forecast								
	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Rate used in Financing Plan	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6

Gearing - 65%

- 12.7** We have assumed that gearing remains at the same level as DPCR5 – 65%.

Vanilla WACC – 3.9%

- 12.8** The value of Vanilla WACC is derived from the cost of equity, cost of debt and gearing assumptions above.

Capitalisation rate - 80% of totex (total core costs)

- 12.9** In DPCR5, costs other than business support and non-operational capex were treated as 85% 'slow pot' (i.e. capitalised into the RAV) and 15% 'fast pot', with business support and non-operational capex treated separately as 100% fast pot.
- 12.10** To avoid any remaining boundary issues in cost classification, we have included business support and non-operational capex in the total pot of costs (totex). Our modelling indicates that treating 80% of totex as slow pot produce the same capitalisation treatment in DPCR5.

Asset lives transitional arrangements

- 12.11** The RIIO-ED1 proposals indicate a 45 year life on assets acquired after 1st April 2015 with the possibility of a transitional arrangement in RIIO-ED1.
- 12.12** In RIIO-T1, the price control for transmission companies, transitional arrangements are in place whereby SHETL, SPTL and NGET respectively have 16, 8 and 8 year transitional periods on new assets, with all three having a gradual increase in asset lives from 20 to 45 years. The cash flow and credit ratios of our four DNOs show significant deterioration during RIIO-ED1 unless a transitional arrangement is put in place.
- 12.13** We have adopted the NGET transitional arrangement which has a linear increase in asset lives from 20 to 45 years within one price control period.

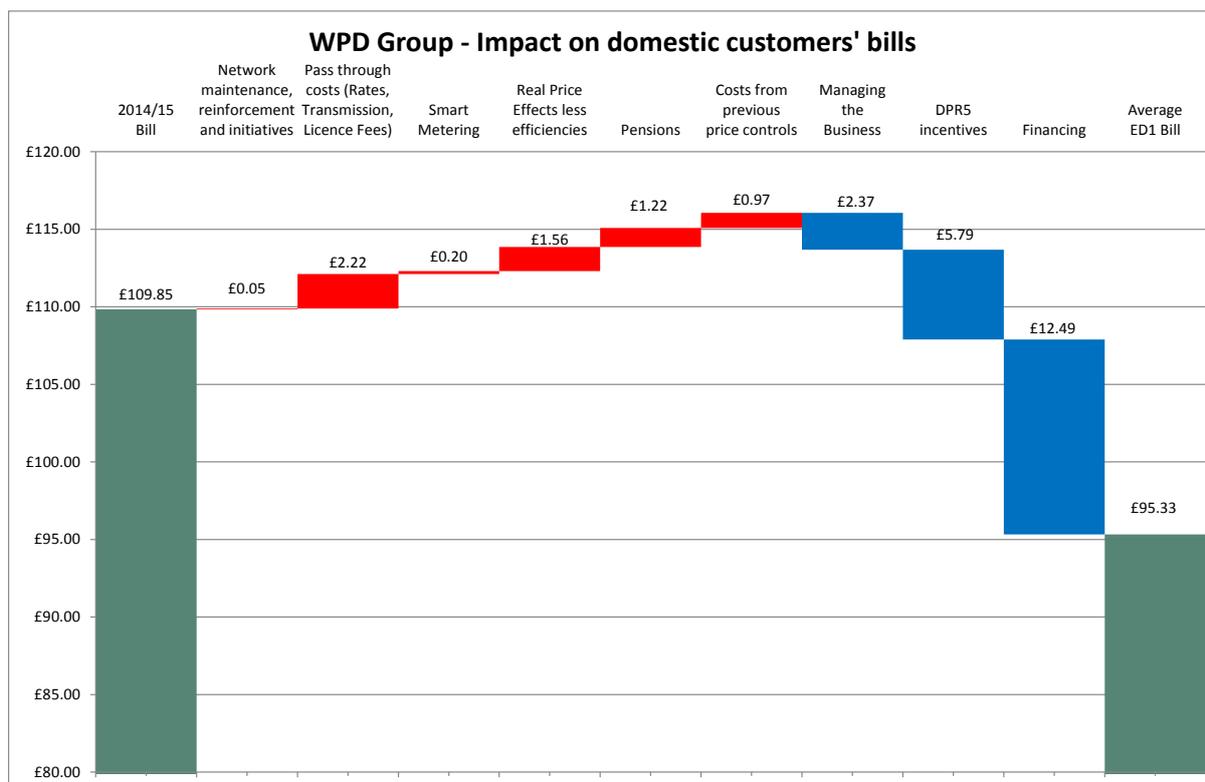
Asset life applied to assets acquired in each year of RIIO-ED1								
2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Average
23.1	26.3	29.4	32.5	35.6	38.8	41.9	45.0	34.1

- 12.14** This equates to an average asset life for new assets (i.e. slow pot additions to RAV) in RIIO-ED1 of just over 34 years, which we have rounded up to 35 years. We require this transitional arrangement in order to ensure we achieve credit ratios that will maintain a minimum credit agency rating of BBB/Baa2 for our four DNOs.
- 12.15** We have employed NERA to assess our cash flow risk. Their Monte Carlo modelling concludes that a capitalisation totex rate of 80%, transitional asset lives of 35 years (which is broadly equivalent to our proposed linear transition) and cost of equity of 6.7% give credit ratios for the RIIO-ED1 period that look consistent with a solid investment grade rating for all WPD entities. A higher capitalisation rate (85%) or a longer asset life assumption for new assets (i.e. immediately moving to 45 years) has a significantly negative impact on our credit ratios.

13 Impact on customers' bills and WPD's revenue request for RIIO-ED1

Impact on customers' bills

- 13.1 Within this Business Plan we set out detailed forecasts for the costs of carrying out the plan and the financing costs we incur to enable us to do so.
- 13.2 Over RIIO-ED1 our charges reduce by an average of 13.2% before inflation.
- 13.3 The change in bills is driven by a number of key areas of expenditure. This is shown for domestic customers in the chart below for our four DNOs combined:



13.4 For our four DNOs the detailed impact on both domestic and business customers' bills is shown below:

How this will impact domestic customer bills									
<i>In 2012/13 prices</i>									
WPD West Midlands									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-10.2%	0.9%	-5.4%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£10.29	£0.81	-£4.97	£0.88	£0.87	£0.88	£0.89	£0.89
Total distribution charge	£101.17	£90.88	£91.69	£86.72	£87.60	£88.47	£89.35	£90.24	£91.13
WPD East Midlands									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-8.2%	0.9%	-4.1%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£7.26	£0.74	-£3.34	£0.78	£0.78	£0.80	£0.81	£0.81
Total distribution charge	£88.11	£80.85	£81.59	£78.25	£79.03	£79.81	£80.61	£81.42	£82.23
WPD South Wales									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-22.7%	0.9%	-1.2%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£28.73	£0.89	-£1.19	£1.01	£0.97	£0.99	£0.98	£1.02
Total distribution charge	£126.28	£97.55	£98.44	£97.25	£98.26	£99.23	£100.22	£101.20	£102.22
WPD South West									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-17.0%	0.9%	-0.5%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£23.35	£1.06	-£0.58	£1.17	£1.15	£1.16	£1.17	£1.18
Total distribution charge	£137.52	£114.17	£115.23	£114.65	£115.82	£116.97	£118.13	£119.30	£120.48
WPD Total (weighted average)									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-13.4%	0.9%	-3.3%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£14.69	£0.87	-£3.14	£0.94	£0.94	£0.94	£0.95	£0.96
Total distribution charge	£109.85	£95.16	£96.03	£92.89	£93.83	£94.77	£95.71	£96.66	£97.62
Notes									
1 Revenues are profiled on a "Po/x basis"; revenues fall in 2015/16 and thereafter increase by 1.0% in real terms other than for DPCR5 IIS									
2 DPCR4 losses excluded because of uncertainty									
3 Smart metering included									
4 K factor included in 2014/15									
5 DPCR5 tax trigger impact included in 2014/15 and thereafter zero									
6 DPCR5 IIS included in 2014/15, 2015/16 and 2016/17 and thereafter zero									
7 IFI and LCNF included for DPCR5; NIA and NIC excluded for RIIO-ED1									
8 Domestic bill represents Profile 1									

How this will impact business customer bills									
<i>In 2012/13 prices</i>									
WPD West Midlands									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-10.2%	0.9%	-5.4%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£24.79	£1.95	-£11.97	£2.11	£2.11	£2.10	£2.14	£2.16
Total distribution charge	£243.71	£218.91	£220.86	£208.89	£211.01	£213.12	£215.22	£217.36	£219.52
WPD East Midlands									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-8.2%	0.9%	-4.1%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£18.30	£1.87	-£8.44	£1.97	£1.98	£2.00	£2.03	£2.04
Total distribution charge	£222.01	£203.71	£205.58	£197.14	£199.11	£201.09	£203.10	£205.13	£207.17
WPD South Wales									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-22.7%	0.9%	-1.2%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£85.85	£2.66	-£3.58	£3.04	£2.91	£2.94	£2.94	£3.04
Total distribution charge	£377.44	£291.59	£294.25	£290.67	£293.70	£296.61	£299.55	£302.49	£305.54
WPD South West									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-17.0%	0.9%	-0.5%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£51.77	£2.34	-£1.29	£2.60	£2.54	£2.57	£2.60	£2.63
Total distribution charge	£304.88	£253.11	£255.45	£254.16	£256.76	£259.31	£261.88	£264.48	£267.10
WPD Total (weighted average)									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Percentage change in distribution costs	n/a	-13.4%	0.9%	-3.3%	1.0%	1.0%	1.0%	1.0%	1.0%
Annual change in £'s	n/a	-£36.94	£2.18	-£7.91	£2.37	£2.35	£2.36	£2.39	£2.42
Total distribution charge	£276.37	£239.44	£241.62	£233.71	£236.09	£238.43	£240.80	£243.19	£245.61
Notes									
1 Revenues are profiled on a "Po/x basis"; revenues fall in 2015/16 and thereafter increase by 1.0% in real terms other than for DPCR5 IIS									
2 DPCR4 losses excluded because of uncertainty									
3 Smart metering included									
4 K factor included in 2014/15									
5 DPCR5 tax trigger impact included in 2014/15 and thereafter zero									
6 DPCR5 IIS included in 2014/15, 2015/16 and 2016/17 and thereafter zero									
7 IFI and LCNF included for DPCR5; NIA and NIC excluded for RIIO-ED1									
8 Business bill represents Profile 3									

WPD's revenue request for RIIO-ED1

13.5 In the previous chapters of this Business Plan we have explained and shown forecasts for the following:

- core expenditure - capital expenditure, network operating costs and indirects;
- pensions – normal and deficit contributions;
- rates and licence fees;
- transmission exit charges ;
- financing costs - cost of debt and cost of equity.

13.6 Our core expenditure costs (totex costs) are split between fast pot and slow pot as previously explained under “Funding the Business Plan”:

- fast pot costs incurred in RIIO-ED1 are recovered in RIIO-ED1;
- slow pot costs incurred in RIIO-ED1 are spread over a number of years known as depreciation to reflect the long term value of network assets.

13.7 Our customer bills are therefore made-up of the following items:

- fast pot costs (including normal pensions);
- depreciation (including normal pensions) on RIIO-ED1 slow pot costs;
- depreciation on previous price control slow pot costs;
- pensions deficit repair payments (including true up from previous price controls);
- rates and licence fees;
- transmission exit charges;
- taxation payments;
- financing costs.

13.8 In addition customer bills may also be adjusted for the following items:

- The fast track reward is included in our plan;
- DPCR5 IQI incentive/cost true-up: our plan takes into account variances between slow pot allowances and actual expenditure in DPCR5 that will be dealt with in RIIO-ED1;
- DPCR5 incentives: our plan does *not* include rewards such as IIS earned in DPCR5 but paid in RIIO-ED1;
- RIIO-ED1 incentive rewards such as IIS are *not* included in the plan;
- DPCR4 losses incentive: our plan does *not* include any reward or penalty for the close-out of the DPCR4 losses mechanism which now seems likely to be settled in 2015/16 and 2016/17 although the amount has yet to be determined.

13.9 We have also considered how our revenues are profiled over the RIIO-ED1 period. WPD would prefer that customers receive a significant one-off reduction in charges in year one of RIIO-ED1 (2015/16) rather than gradually spreading the reduction over a number of years, in order to provide more stability in our charges. Following consultation with our owner we have profiled our revenues so that there is a one-off reduction of 13.8% in 2015/16 followed thereafter by an increase of 1.0% per annum before inflation for the remainder of the RIIO-ED1 period.

13.10 In total our revenue request for RIIO-ED1 amounts to £10.7bn in 2012/13 prices as detailed in the following tables:

WPD Revenue Requirement in RIIO-ED1 (£m in 2012/13 prices)

West Midlands	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
Fast Pot Costs	52.1	52.1	50.6	51.5	53.1	54.1	53.6	54.1	421.2
Depreciation on Slow Post Costs (RAV)	169.5	173.1	174.9	176.5	177.2	178.2	162.7	161.6	1,373.6
Pension Deficit Repair Payments	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	165.7
Rates and Licence Fees	28.3	28.3	31.3	36.5	42.7	43.4	41.8	41.8	294.1
Transmission Exit Charges	12.7	13.0	13.2	13.2	13.5	14.1	14.1	14.1	108.0
DPCR5 IQI Incentive/Costs True-up	1.2	1.2	1.3	1.3	1.4	1.5	1.5	1.6	11.0
Financing Costs	74.7	76.1	77.3	78.5	79.7	81.1	82.8	84.9	635.1
Taxation Payments	18.0	17.9	17.7	16.8	15.5	15.2	15.9	15.9	133.0
Fast Track Reward	6.5	6.5	6.3	6.4	6.6	6.8	6.7	6.8	52.6
Total - Unprofiled Revenues	383.7	389.1	393.3	401.5	410.5	415.0	399.8	401.5	3,194.4
Revenue Profiling	2.1	0.4	0.1	-4.1	-9.1	-9.6	9.6	11.9	1.4
Total - Profiled Revenues	385.8	389.6	393.4	397.4	401.4	405.3	409.4	413.4	3,195.8
East Midlands	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
Fast Pot Costs	57.0	55.7	49.6	50.5	49.9	51.9	54.5	53.0	422.2
Depreciation on Slow Post Costs (RAV)	161.1	166.4	170.1	171.1	171.7	171.7	153.3	154.3	1,319.6
Pension Deficit Repair Payments	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	163.3
Rates and Licence Fees	36.7	36.8	40.6	47.6	55.3	56.0	54.4	54.4	381.6
Transmission Exit Charges	10.5	10.5	10.9	10.9	11.6	11.9	12.6	13.8	92.9
DPCR5 IQI Incentive/Costs True-up	3.5	3.6	3.8	4.0	4.2	4.3	4.5	4.8	32.6
Financing Costs	71.1	73.5	75.2	76.3	77.5	78.7	80.6	83.0	615.9
Taxation Payments	16.2	15.8	15.6	14.6	13.2	13.2	13.4	13.3	115.3
Fast Track Reward	7.1	7.0	6.2	6.3	6.2	6.5	6.8	6.6	52.8
Total - Unprofiled Revenues	383.7	389.8	392.4	401.6	410.0	414.6	400.5	403.4	3,196.2
Revenue Profiling	2.3	0.0	1.2	-4.0	-8.5	-9.1	9.1	10.2	1.1
Total - Profiled Revenues	386.0	389.8	393.6	397.6	401.5	405.5	409.6	413.7	3,197.3
South Wales	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
Fast Pot Costs	29.4	29.4	28.0	29.8	27.3	27.4	26.4	26.9	224.6
Depreciation on Slow Post Costs (RAV)	83.9	85.0	78.7	78.0	76.6	75.7	75.1	74.5	627.6
Pension Deficit Repair Payments	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	172.9
Rates and Licence Fees	16.3	16.3	20.1	20.3	20.1	20.5	19.7	19.7	153.0
Transmission Exit Charges	8.5	8.5	8.5	8.6	8.6	8.6	8.6	8.8	68.8
DPCR5 IQI Incentive/Costs True-up	2.3	2.4	2.5	2.7	2.8	2.9	3.1	3.2	21.9
Financing Costs	32.2	33.4	34.7	36.1	37.6	38.8	40.1	41.3	294.2
Taxation Payments	7.5	7.2	6.3	5.8	5.9	5.8	6.1	6.1	50.8
Fast Track Reward	3.7	3.7	3.5	3.7	3.4	3.4	3.3	3.4	28.1
Total - Unprofiled Revenues	205.4	207.6	204.0	206.6	204.0	204.7	204.1	205.5	1,641.8
Revenue Profiling	-6.7	-7.0	-1.5	-1.9	2.7	4.0	6.7	7.4	3.7
Total - Profiled Revenues	198.7	200.6	202.5	204.6	206.7	208.7	210.8	212.9	1,645.5
South West	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
Fast Pot Costs	43.0	43.0	42.1	42.9	42.1	42.6	42.6	44.6	342.9
Depreciation on Slow Post Costs (RAV)	111.7	115.4	117.7	119.0	120.2	120.9	109.1	109.1	923.1
Pension Deficit Repair Payments	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	281.3
Rates and Licence Fees	16.3	16.3	17.8	20.8	22.1	22.7	21.4	21.4	158.9
Transmission Exit Charges	8.7	8.7	8.7	8.7	9.2	9.2	9.2	9.2	71.8
DPCR5 IQI Incentive/Costs True-up	4.3	4.5	4.7	4.9	5.1	5.4	5.6	5.9	40.4
Financing Costs	47.5	49.7	51.8	53.8	55.7	57.6	59.8	62.3	438.2
Taxation Payments	11.6	11.0	10.3	9.2	8.7	8.3	8.5	7.9	75.5
Fast Track Reward	5.4	5.4	5.3	5.4	5.3	5.3	5.3	5.6	42.9
Total - Unprofiled Revenues	283.6	289.2	293.5	300.0	303.6	307.1	296.7	301.2	2,375.0
Revenue Profiling	3.3	0.4	-1.1	-4.5	-5.3	-5.8	7.6	6.1	0.7
Total - Profiled Revenues	286.9	289.6	292.4	295.4	298.4	301.3	304.3	307.3	2,375.7
WPD Combined	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
Fast Pot Costs	181.5	180.3	170.4	174.7	172.4	175.9	177.1	178.6	1,410.9
Depreciation on Slow Post Costs (RAV)	526.1	540.0	541.4	544.6	545.7	546.4	500.2	499.5	4,243.9
Pension Deficit Repair Payments	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.9	783.1
Rates and Licence Fees	97.6	97.8	109.8	125.2	140.3	142.5	137.2	137.2	987.6
Transmission Exit Charges	40.4	40.7	41.3	41.5	43.0	43.9	44.6	45.9	341.5
DPCR5 IQI Incentive/Costs True-up	11.2	11.7	12.3	12.9	13.5	14.1	14.8	15.5	105.9
Financing Costs	225.5	232.8	239.0	244.7	250.5	256.3	263.3	271.4	1,983.5
Taxation Payments	53.4	51.9	49.9	46.4	43.3	42.5	43.8	43.3	374.6
Fast Track Reward	22.7	22.5	21.3	21.8	21.6	22.0	22.1	22.3	176.4
Total - Unprofiled Revenues	1,256.4	1,275.7	1,283.3	1,309.7	1,328.1	1,341.5	1,301.1	1,311.6	10,407.4
Revenue Profiling	1.0	-6.2	-1.2	-14.6	-20.2	-20.6	33.0	35.7	6.9
Total - Profiled Revenues	1,257.4	1,269.5	1,282.0	1,295.1	1,308.0	1,320.9	1,334.1	1,347.3	10,414.3

Impact on suppliers

- 13.11** The revenues that we will recover from suppliers are detailed in accordance with DCUSA DCP66A tables. They will be updated every quarter and published separately. They are available at the following link <http://www.westernpower.co.uk/About-us/Stakeholder-information/Our-Future-Business-Plan/Supplier-Information.aspx>
- 13.12** WPD understand that charging volatility is a key issue for suppliers and that they seek stable and predictable pricing structures with longer charge notification periods. WPD support the recommendations of Ofgem's October 2012 Decision in relation to measures to mitigate network charging volatility arising from the price control settlement. As part of our plan we have therefore clearly set out the evolution of revenues and charges in an industry common format. We have committed to updating and publishing this information every three months.
- 13.13** Through our work with suppliers we are aware of other proposals in addition to those in the Ofgem decision document requiring longer notice periods for charges. We are willing to work with suppliers and Ofgem on this issue and would be happy to participate in discussions that investigate the merits of an approach whereby the industry fixes its DUoS prices further in advance of price application so that we can better understand if the transfer of risk from suppliers to distribution businesses is in the best interests of both suppliers and end use customers.

14 Glossary

A

Accident Frequency Rate

The number of accidents that occur divided by the number of people employed (allowing a like for like comparison irrespective of the number of staff employed).

Alliance

A method of working with contractors, where resources from both the main business and the contractors are shared within a combined organisation.

B

Broad Measure of Customer Satisfaction (BMCS)

A composite incentive consisting of a customer satisfaction survey, a complaints metric and stakeholder engagement. It was introduced for DPCR5 and is designed to drive improvements in the quality of the overall customer experience by capturing and measuring customers' experiences of contact with their DNO across the range of services and activities the DNOs provide.

British Telecom 21st Century (BT 21 CN)

British Telecom is in the process of converting its existing telecommunications network to an internet protocol system known as BT 21st Century Network. This will move away from pre-determined hard wired routes for communication to a system that can route communications around the internet where communication paths are not determined.

Building Research Establishment Environmental Assessment Method (BREEAM)

A methodology used by the building industry to assess the environmental aspects of building construction and refurbishment.

Business Carbon Footprint (BCF)

The BCF scheme was introduced as a reputational incentive in DPCR5 to encourage DNOs to consider the direct carbon impact of conducting their operations and to be proactive in the reduction of emissions.

C

Capital expenditure (Capex)

Expenditure on investment in long-lived distribution assets, such as underground cables, overhead electricity lines and substations.

Carbon Plan

First published in December 2011, the Carbon Plan sets out the government's plans for achieving the emissions reductions it committed to in the first 4 carbon budgets (5 year periods each). Emissions in the UK must, by law, be cut by at least 80% of 1990 levels by 2050. The UK was first to set its ambition in law and the Plan sets out progress to date and assesses cost-effective next steps. Within the plan it states "This Carbon Plan sets out a vision of a changed Britain, powered by cleaner energy

used more efficiently in our homes and business, with more secure energy supplies and more stable energy prices, and benefitting from the jobs and growth that a low carbon economy will bring”.

Centre for Sustainable Energy (CSE)

An independent national charity that helps people and organisation from the public, private and voluntary sectors meet the twin challenges of rising energy costs and climate change.

Closed Circuit Television (CCTV)

A video based security monitoring system that presents images on television screens in a monitoring centre from cameras installed at remote sites allowing activities to be recorded and intruders to be identified.

Condition Based Risk Management (CBRM)

This is an asset replacement modelling approach that makes use of condition information to forecast which assets require to be replaced and when.

Constant Maturity Swap (CMS)

A constant maturity swap (CMS) is an interest rate swap where the interest rate on one leg is reset periodically, but with reference to a market swap rate rather than LIBOR. The other leg of the swap is generally LIBOR, but may be a fixed rate or potentially another constant maturity rate. The prime factor for a constant maturity swap is the shape of the forward implied yield curves.

Cost Benefit Analysis (CBA)

A methodology that compares the costs of carrying out an investment against the benefits (such as risk reduction or service improvement) to compare different options and demonstrate value for money.

Cost of Debt

The effective interest rate that a company pays for its loans.

Cost of Equity

The rate of return on investment required by a company's shareholders.

Customers Interrupted (CIs)

The number of customers whose supplies have been interrupted per 100 customers per year over all incidents, where an interruption of supply lasts for three minutes or longer, excluding re-interruptions to the supply of customers previously interrupted during the same incident.

Customer Minutes Lost (CMLs)

The average duration of interruptions to supply per year, where an interruption of supply to customer(s) lasts for three minutes or longer.

Customer Service Excellence

This is a Government scheme which recognises organisations that provide effective and excellent customer service. Similar assessments were previously awarded the Charter Mark.

D

DECC

The Government Department of Energy and Climate Change.

Distributed Generation (DG)

Generation connected to the distribution network. It includes wind turbines, domestic solar panels, large scale photo-voltaic farms, hydro-electric power and biomass generators.

Distribution Network Operators (DNOs)

A DNO is a holder of an electricity distribution licence. There are 14 DNOs which are owned by six different groups.

Distribution Price Control Review 5 (DPCR5)

The current price control period running from 1 April 2010 until 31 March 2015. It is the fifth using RPI-X regulation and will be replaced with the RIIO framework from 1 April 2015.

Distribution Use of System (DUoS)

These are the charges levied to suppliers for DNO costs that can be recovered from customers. The amount is determined through price control reviews.

E

EA Technology

EA Technology are a research company that have been contracted jointly by all DNOs to develop and maintain a model (registered name Transform) to assess the cost of the impact of low carbon technologies on the network.

Electricity, Safety, Quality and Continuity Regulations 2002 (ESQCR)

The ESQCR specify safety standards, which are aimed at protecting the general public and customers from danger. In addition, the regulations specify power quality and supply continuity requirements. The regulations were amended in 2006 to include a requirement for resilience tree clearance.

ENMAC™

ENMAC is the trade name for GE Network Solutions control room software used for managing real-time operation of the distribution network.

Extra High Voltage (EHV)

Voltages over 20kV up to, but not including, 132kV.

F

Fast pot

Fast pot is the revenue that is recovered in the year of expenditure.

G

Gearing

A ratio measuring the extent to which a company is financed through borrowing.

General Packet Radio Service (GPRS)

GPRS is a technology that allows the transfer of data across the mobile phone network.

Guaranteed Standards of Performance (GSOPs)

Guaranteed Standards of Performance set minimum service levels to be met across a range of activities covering supply interruptions, appointments and connections. They are specified in a Statutory Instrument and where a licence holder fails to provide the level of service required, it must make a payment to the customer affected subject to certain exemptions.

H

Health and Safety Executive (HSE)

A Government organisation that has the responsibility of enforcing health and safety legislation.

Health Index (HI)

Framework for collating information on the health (or condition) of distribution assets and for tracking changes in their condition over time.

High voltage (HV)

Voltages over 1kV up to, but not including, 22kV.

I

Incentive on Connections Engagement (ICE)

This is a new incentive being introduced into RIIO-ED1 intended to drive DNOs to improve communication and interaction with major customers.

Information Quality Incentive (IQI)

A regulatory incentive mechanism that drives DNOs to provide accurate cost forecasts in their Business Plans and drive efficient expenditure

Information Technology and Telecoms (IT&T)

Computer and telecommunication systems.

Inspections and Maintenance (I&M)

The activities carried out on a routine basis for the visual checking of the external condition of assets and the invasive examination of plant and equipment.

Interruption incentive scheme (IIS)

The interruption incentive scheme is a mechanism that provides annual rewards and penalties based on each DNO's performance against their targets for the number of customers interrupted per 100 customers (CI) and the number of customer minutes lost (CML).

ISO 14001

This is an international standard for environmental management systems.

L

Load Index (LI)

Framework, introduced as part of DPCR5, demonstrating the utilisation of individual substations or groups of interconnected substations. It is used as a secondary deliverable capturing the effects of load related investment.

Low Carbon Networks Fund (LCNF)

A funding mechanism introduced under DPCR5 to encourage DNOs to prepare for the role they will have to play as GB moves to a low carbon economy. £500m is available for DNOs and partners to innovate and trial new technologies, commercial arrangements and ways of operating networks. The last LCNF competition will run in 2014. It will be replaced by the Network Innovation Competition and Network Innovation Allowance during RIIO-ED1.

LCNF Tier 1

LCNF Tier 1 is a funding mechanism for small innovation projects. During DPCR5, Ofgem has allocated £80m between all DNOs.

LCNF Tier 2

LCNF Tier 2 is a funding mechanism for significant 'flagship' innovation projects. During DPCR5, £320m of will be provided centrally, with DNOs competing for funding.

Low Carbon Technology (LCT)

This is the collective term for devices that reduce the amount of carbon being used for heating, transport and generation. It includes electric vehicles, heat pumps and solar generation.

Low Voltage (LV)

This refers to voltages up to, but not including, 1kV.

N

National Grid

The 400kV and 275kV network used to transport electricity around the country from sources of large scale generation such as power stations and off-shore wind farms to substations that feed into DNO electricity networks.

O

Office of Gas and Electricity Markets (Ofgem)

Ofgem is responsible for regulating the gas and electricity markets in the UK to ensure customers' needs are protected.

P

Perfluorocarbon Tracer (PFT)

A chemical that is injected into fluid filled cables, used to speed up the location of leaks.

Priority Service Register (PSR)

A database that records details about vulnerable customers so that additional support can be provided.

R

Real Price Effects (RPE)

Increase in prices, of materials, direct staff or contract labour, over and above increases in the Retail Price Index.

Referral Partners

There are independent organisations (e.g charities) that take an active role in dealing with social issues and have agreed to provide support to people referred to them by WPD.

Regulatory Asset Value (RAV)

The value ascribed by Ofgem to the capital employed in the licensee's regulated distribution business. The RAV is calculated by summing an estimate of the initial market value of each licensee's regulated asset base at privatisation and all subsequent allowed additions to it at historical cost, and deducting annual depreciation amounts calculated in accordance with established regulatory methods. The revenues licensees are allowed to earn under their price controls include allowances for the regulatory depreciation and also for the return investors are estimated to require to provide the capital.

Remote Terminal Unit (RTU)

Communications devices that transmit data about the status of the network back to the control centre.

Resilience Tree Cutting

This is the full removal or extensive cutting of trees that are found to be within the falling distance of overhead power lines. This ensures that they cannot cause damage to the power lines in the event of severe weather.

Revenue = incentives + innovation + outputs (RIIO)

Ofgem introduced a new regulatory framework in 2010 replacing previous RPI-X regime. It places more emphasis on incentives to drive the innovation needed to deliver a sustainable energy network at value for money to existing and future consumers.

RIIO Electricity Distribution 1 (RIIO-ED1)

The price control period that will run from 1 April 2015 to 31 March 2023. It is the first electricity distribution price control that will use the RIIO framework for setting allowances.

RIIO Electricity Distribution 2 (RIIO-ED2)

The electricity distribution price control period that will run from 1 April 2023 to 31 March 2031.

RPI-X

The form of price control currently applied to network monopolies. Each company is given a revenue allowance in the first year of each control period. The price control then specifies that in each subsequent year the allowance will move by 'X' per cent in real terms.

S

Slow pot

Slow pot is where costs are added to the RAV and revenues allow recovery of the costs over time together with the cost of financing this expenditure in the interim.

Smart Grid

A generic term for a range of measures that are used to operate electricity networks allowing more generation or demand (load) to be connected to a given electricity circuit without the need for traditional reinforcement (or upgrade) of that equipment.

Smart Grid Forum (SGF)

The Smart Grid Forum was established by Ofgem and DECC in early 2011 bringing together key opinion formers, experts and stakeholders involved in the development of smart grids, with the aim of providing strategic input to help shape Ofgem's and DECC's thinking and leadership in smart grid policy and deployment.

Sulphur Hexafluoride (SF6)

A potent greenhouse gas widely used in transmission and distribution equipment.

Supervisory Control and Data Acquisition (SCADA)

This is the term used for the systems used to monitor and control distributed assets. It comprises the remote terminal units, communication infrastructure and human interface within central control rooms.

T

Totex

Total of capital expenditure (capex) for network investment plus operational expenditure (opex) for running the business.

Transform Model

The model – developed by EA Technology - which uses a representation of the network and calculates the investment needed to accommodate LCTs using either smart grid solutions or traditional network reinforcement. The smart solutions include 'demand side response' as well as additional technology to move load around the network and utilise the full capacity of assets.

Turnkey

This is a contractual arrangement where the design and construction of a project is handed over to a third party.

V

Vanilla Weighted Average Cost of Capital (Vanilla WACC)

This is the combined cost rate of funding calculated using a pre-tax cost of debt and post-tax cost of equity weighted by notional gearing.

Vulnerable Customers

Customers who are medically dependent upon electricity, have special communication requirements or have other special needs with a dependence upon electricity (e.g. stair lift).

W

Western Power Distribution (WPD)

The electricity distribution network operator that holds four distribution licences in West Midlands, East Midlands, South Wales and South West.

Worst Served Customers

Customers who experience 12 or more higher voltage interruptions over a three year period, with a minimum of three in any one year.