Investing in the electricity network

Bristol 2017/18

WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

Contacts in your area

Somerset:
Christian Hjelm
01823 348571
chjelm@westernpower.co.uk
Venture Way, Priorswood Ind Estate,
Taunton, TA2 8DE

Devon:
Paul Elsen
01392 352550
pelsen@westernpower.co.uk
Osprey Road, Sowton, EX2 7WP

Mendip:
Neil Patten
01761 405130
npatten@westernpower.co.uk
Radstock Road, Midsomer Norton,
Bath, BA3 2AA

and

1 Warne Road, Winterstoke,
Commercial Centre, Weston-super-Mare,
Somerset, BS23 3UU

Bodmin:
Mike Rogers
01208 892239
mrogers@westernpower.co.uk
Lostwithiel Road, Bodmin, Cornwall, PL31 1DE

Bristol:
Gywn Jones
0117 933 2145
gjones@westernpower.co.uk
Avonbank, Feeder Road, Bristol, BS2 0TB

North Devon:
Andy Manning
01271 347720
amanning@westernpower.co.uk
Victoria Road, Barnstaple, Devon, EX32 8PR

West Cornwall:
Jon Nesbitt
01209 616742
jnesbitt@westernpower.co.uk
Trevenson Road, Pool, Redruth, TR15 3RF

Plymouth:
Chris Garnsworthy
01752 502006
cgarnsworthy@westernpower.co.uk
Elliot Road, Prince Rock, Plymouth, PL4 0SD

Meet your local team

My name is Gwyn Jones and I am the Distribution Manager for Bristol. I am responsible for the geographic area from approximately the M4 motorway, down to Avonmouth (Shirehampton)/Highridge Common and easterly to Pucklechurch; the total number of customers being just short of 300,000. Helping to run this area are five team managers who deal with asset maintenance, fault rectification and new connections. Additionally, I have 91 members of staff, ranging from craftspersons to administrative support to technical specialists, to assist the five managers. Fundamentally, customers want a safe and reliable electricity supply, and that is what we take very seriously. Last year, on average, we restored 96% of supplies within the first hour of a high voltage fault happening. Clearly, having no interruption in supply in the first place is the first priority, and to that end, we are investing heavily in asset replacement. Please feel free to contact me if you would like to discuss our investment.

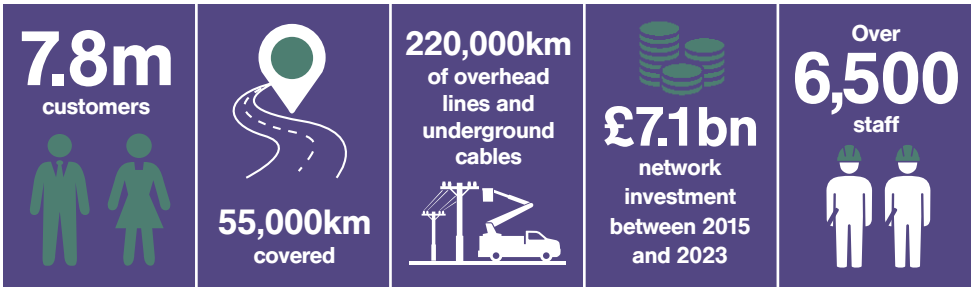
Why I am writing to you

Western Power Distribution (WPD) is investing £7.1 billion in the electricity distribution network between 2015 and 2023. This investment will go into reinforcing the existing network, improving network reliability, providing additional capacity and upgrading equipment.

We want to make sure that all of our stakeholders are aware of the changes and improvements being made, particularly in their local area.

This brochure details the investment in the Bristol electricity network that WPD is making and specifically some of the local projects that are being undertaken or have been completed by my team this year.

Western Power Distribution has:



Who we are and what we do

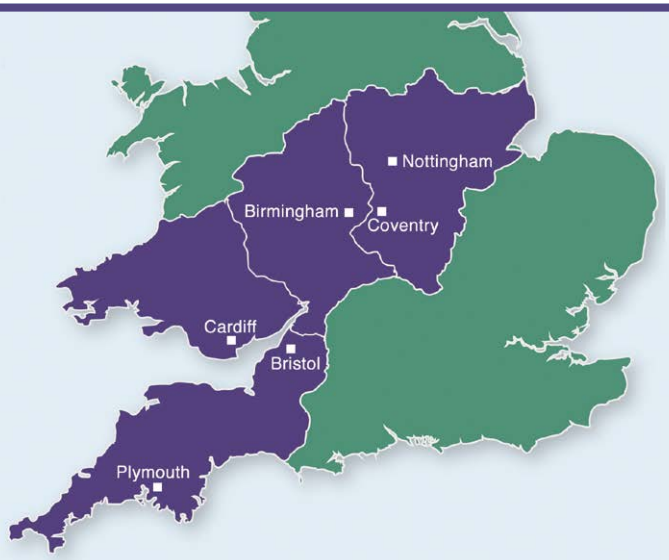
Western Power Distribution (WPD) is a Distribution Network Operator (DNO). This means we are responsible for the network of underground cables, overhead lines and substations that distribute electricity to customers' homes and businesses every day.

Our key responsibilities

- Operate the distribution network assets effectively to keep the lights on.
- Maintain our assets to ensure they remain in a reliable condition.
- Fix our assets if they get damaged or are faulty.
- Upgrade the existing networks or build new ones to provide additional electricity supplies and capacity for our customers.
- We are not an electricity supplier (the company who looks after your meter and sends bills).

Where we operate

WPD covers the East and West Midlands, South West England and South Wales. In the South West, we have depots in Bodmin, Bristol, Devon, Plymouth, Redruth, Sowton, Taunton and Weston-Super-Mare.



WPD investment

Our network covers densely populated residential areas and widely dispersed rural communities, from the Wash in Lincolnshire down through South Wales and to Land's End and the Isles of Scilly in Cornwall. The diversity of our network can cause a variety of issues across the distribution area. This, combined with the age of the network (a large proportion of our assets were built in the 1960s) and recent environmental challenges, means we will need to invest more than ever to keep our network efficient and reliable in order to keep the lights on.

Our Business Plan outlines our investment commitments until 2023 and was submitted to our regulator, the Office of Gas and Electricity Markets (Ofgem), in 2015. WPD was the only DNO out of six in the UK to have its Business Plan 'fast-tracked'. This allowed us to maximise and secure our investment funding early. In 2015-2023 we have committed to investing £7.1 billion in our network while reducing charges to customers by an average of 13%. This results in a total investment of £1.71 billion in the South West network.

In 2018, WPD is investing approximately

£9 million

in Bristol

Project types

Due to the diversity of our network, various issues arise which must all be dealt with. This requires a range of engineering solutions to keep our network running. These solutions can be categorised as follows:

Asset replacement

Directly changing our network assets, usually due to condition or age.

Reinforcement

Upgrading our network to deal with increased demand.

Cable undergrounding

Replacing an overhead line with an underground cable for either safety or environmental reasons.

Worst served customers

Improving the network for those with the most outages (over 12 outages in three years).

Resilience

Mitigating against the effects of adverse weather; building flood defences, tree trimming, etc.

Cable diversions

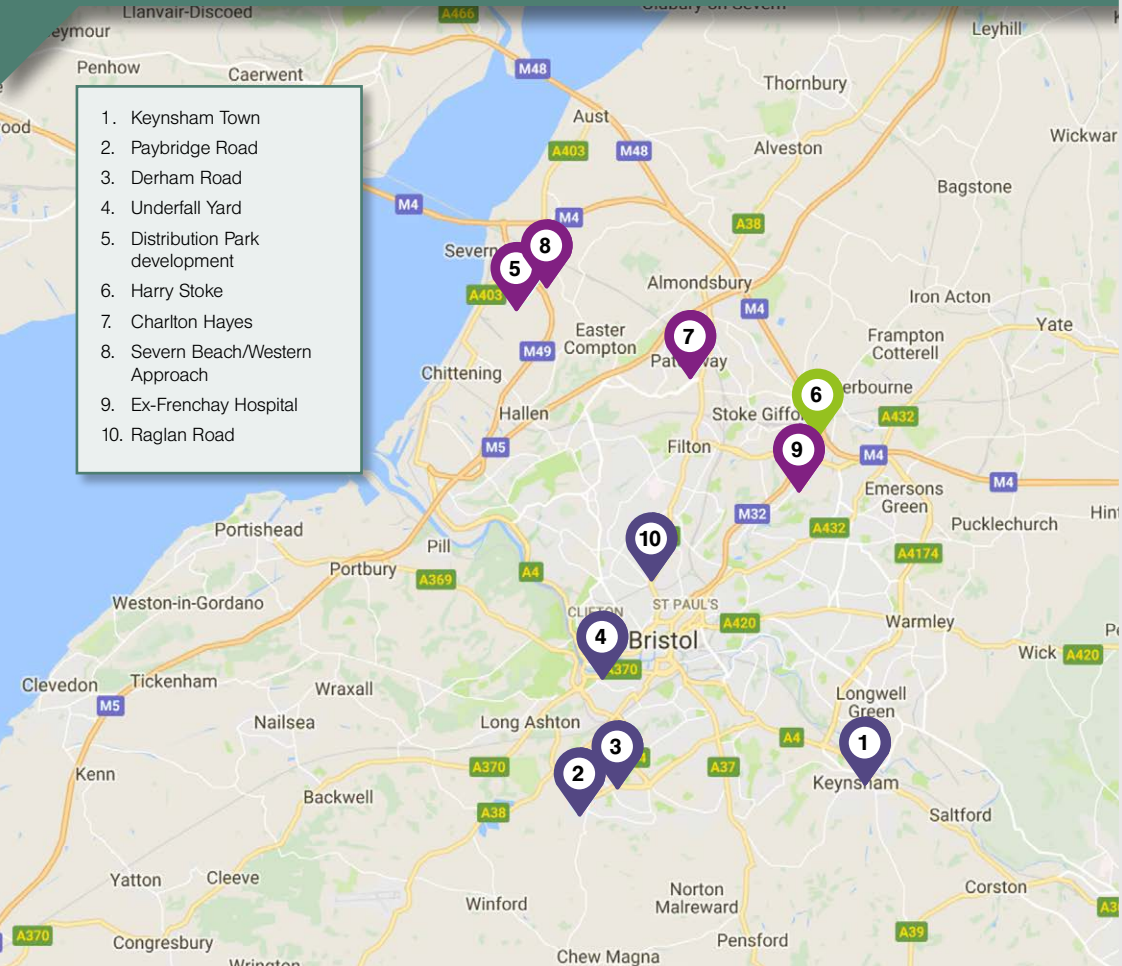
Moving the cable in the ground due to new building works.

Project locations

WPD is constantly carrying out works to maintain and improve the network, yet the large one-off projects that we commission by looking at the entire network tend to get reported more often. However, we believe that the smaller, local projects are just as important and therefore could be reported to the customers affected in the local area.

This brochure will detail a selection of the projects that are planned and being completed in 2017 and 2018 in the Bristol area. The map below shows the locations of those projects.

For information on works in the rest of the WPD area, please contact us or visit our website.



Projects in Bristol

South East

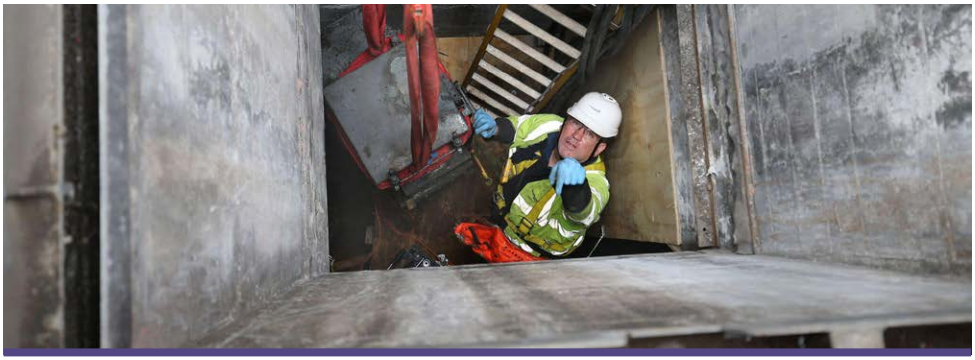
Keynsham Town

Total spend: £125,000
Customers affected: 79,000
Start quarter: Q1 2018
End quarter: Q4 2018
Duration: 1 year
Details: We are replacing old Link Distribution Boxes (LDBs) that reside within footpaths. These provide us with the ability to redirect electricity for maintenance and fault purposes. Many link boxes have been in the ground for circa 40 years and have served us well. However, many are now showing signs of age and need replacing to ensure we deliver the best standard of service to customers.
Customer benefits: Removing old Link Distribution Boxes (LDBs) will improve the overall operational reliability and flexibility of the distribution network, ultimately improving customer service. This means that if we are undertaking routine maintenance work, we are better able to keep people's electricity supply on.

Paybridge Road

Total spend: £46,000
Customers affected: 1,755
Start quarter: Q2 2018
End quarter: Q3 2018
Duration: 2 months
Details: As well as changing the switchgear at this location for a more modern type which requires less maintenance and gives us the ability to automate it for fast customer restoration when fault switching, we are removing an inefficient transformer to reduce electrical heating losses associated with the unit.
Customer benefits: Network reliability and flexibility will be improved as well as saving wasted energy associated with the pre-1958 transformer.

Projects in Bristol



South West

Derham Road

Total spend: £125,000
Customers affected: 90,000
Start quarter: Q1 2018
End quarter: Q4 2018
Duration: 1 year
Details: We use Link Distribution Boxes (LDBs) to re-route the electricity supplies in urban areas for either planned work or emergency restoration work. We need safe and reliable LDBs and so we are now replacing many of those that have come to the end of their useful life.
Customer benefits: By having new Link Distribution Boxes (LDBs) we can improve the security of our electricity supply and the overall resilience of the network. This is a very high priority for our stakeholders.

Underfall Yard

Total spend: £129,000
Customers affected: 1,697
Start quarter: Q3 2018
End quarter: Q3 2018
Duration: 1 month
Details: Following a condition assessment, the 1961 switchgear within this substation has come to the end of its useful life and will be replaced, and the substation is being moved to a different site.
Customer benefits: New electrical switches will enable a faster response should a fault happen on the network. The locality of the new substation will enable Western Power Distribution to restore electricity supplies much faster in the event of a fault.

Projects in Bristol

North West

Distribution Park development

Total spend: £150,000
Customers affected: 20
Start quarter: Q1 2018
End quarter: Q4 2018
Duration: 1 year
Details: This is a major distribution warehouse area for companies such as Farmfoods and The Range. To date, we are installing three high voltage substations to provide 3MW of demand to the newly erected units.
Customer benefits: The benefits for the local community in Bristol include increasing the vibrancy and affluence in the area, and raising Bristol's profile as a great place to set up and do business.

Harry Stoke

Total spend: £700,000
Customers affected: 2,000
Start quarter: Q4 2018
End quarter: Q4 2019
Duration: 1 year
Details: Replacement of existing 132kV steel tower line with underground cable to enable electrification of the main Paddington to Cardiff railway and clearing the site for new homes to be constructed and connected.
Customer benefits: Improved railway efficiency for the rail travelling public, and helping to satisfy the ever-increasing demand for homes in this popular area of Bristol.

Projects in Bristol

Charlton Hayes

Total spend: £340,000
Customers affected: 1,800
Start quarter: Q1 2018
End quarter: Q4 2019
Duration: 20 months
Details: Providing 1,800 connections to new homes by installing four new substations. To link the substations with the new properties, we will be installing about 10,000 meters of underground cable.
Customer benefits: The total installed capacity to cater for the new development will be 3.5MW – equivalent to switching on about 1,400 kettles all at once. We plan to link the network on this new site with adjacent ones so that we have improved ability to divert power in the event of a fault, thus restoring customers effectively should an issue develop on the network. We are always looking to enhance flexibility to deal with the unwanted reality of unplanned interruptions.

Severn Beach/Western Approach

Total spend: £140,000
Customers affected: 520
Start quarter: Q3 2016
End quarter: Q3 2019
Duration: 3 years
Details: In order to secure electricity supplies to new business in the area, it has been necessary to reinforce the electrical distribution network by laying approximately 5km of high voltage cable.
Customer benefits: The direct result of this reinforcement is that we are able to securely supply new business units in this part of Bristol. The additional indirect consequence is that we are also able to provide a more secure electricity supply to the locality, which is very useful during fault situations.

Projects in Bristol

North East

Ex-Frenchay Hospital

Total spend: £285,000
Customers affected: 480
Start quarter: Q1 2018
End quarter: Q4 2018
Duration: 1 year
Details: This is the redevelopment of the old Frenchay Hospital site by Redrow Homes in the north of the city, close to the M32 and M4 motorways. The hospital was closed and the land sold for development. 480 homes are being built and WPD is building a new substation and laying about 2,000 meters of cable to provide electricity connections to the new homes.
Customer benefits: The new electricity connections we are providing are an essential part of the utility infrastructure to this new housing development.

Raglan Road

Total spend: £137,800
Customers affected: 1,060
Start quarter: Q3 2018
End quarter: Q3 2018
Duration: 1 month
Details: Currently, our substation in Raglan Road is located beneath the ground. This makes getting to it a slow process due to the safety protocols required. This is not a good thing if we want fast access to restore customers during a fault. Placing the substation above ground and renewing 110m of underground cable will make this a much more useful substation.
Customer benefits: Moving the substation from an underground chamber to a site that is above the ground will significantly enhance our ability to re-connect customers following a fault on our network.

Major Projects in the South West

Bridgwater to Seabank

Total spend: £1.4m
Customers affected: 72,199
Start quarter: Q2 2016
End quarter: Q2 2017
Duration: 1 year
Details: Upgrade to Churchill 132kV substation, refurbishment of 132kV overhead lines and protection changes at various substations.
Customer benefits: Agreed as a target project with Ofgem, the scheme delivered further opportunities for generation to be connected in Devon and Cornwall.

Falmouth, Bickland Hill

Total spend: £1m
Customers affected: 12,469
Start quarter: Q3 2017
End quarter: Q4 2017
Duration: 6 months
Details: Due to the age and condition of the equipment, the two 33/11kV transformers and the 11kV switchgear have been replaced.
Customer benefits: New, more modern equipment will provide a more reliable supply to the local area for many years to come.

Fraddon

Total spend: £6.5m
Customers affected: 47,276
Start quarter: Q1 2016
End quarter: Q2 2018
Duration: 2 years
Details: Reinforcement of the grid transformers and associated 132kV circuits was required. The final result will see two new grid transformers and some 132kV cable sections. We also replaced the aged outdoor EHV substation.
Customer benefits: The scheme will deliver further opportunities for generation to be connected in Cornwall and a more reliable network for many years to come.

Ilfracombe

Total spend: £600,000
Customers affected: 9,306
Start quarter: Q1 2017
End quarter: Q4 2017
Duration: 9 months
Details: Due to the age and condition of the equipment on site, the two 33/11kV transformers were replaced in turn.
Customer benefits: This will deliver a more reliable and long-lasting network better able to cope with any rising customer demand.

Major Projects in the South West

Old Green Windfarm

Total spend: £800,000
Customers affected: 1
Start quarter: Q2 2017
End quarter: Q4 2017
Duration: 9 months
Details: Connecting a new 7MW wind farm to the north of Bristol, the customer installed a new 132kV substation and WPD redirected an existing 132kV tower line.
Customer benefits: Supporting the move towards further renewable generation with the connection of a wind power generation site.

Sherford

Total spend: £112,000
Customers affected: 5,500
Start quarter: Q1 2017
End quarter: Q4 2017
Duration: 9 months
Details: WPD successfully connected a new EHV substation to the east of Plymouth. This will take the load required by the new Sherford development.
Customer benefits: Connecting supplies to a new community development with the potential to build 5,500 homes and the associated infrastructure.

Budleigh Salterton

Total spend: £320,000
Customers affected: 2,375
Start quarter: Q2 2017
End quarter: Q3 2017
Duration: 3 months
Details: Due to the age and condition of the equipment, the 33/11kV transformers, 33kV switch and 11kV switchgear were replaced.
Customer benefits: New, more modern equipment aided by being moved indoors will provide a more reliable supply to the local area.

Taunton

Total spend: £1.2m
Customers affected: 10,658
Start quarter: Q2 2015
End quarter: Q3 2018
Duration: 3 years
Details: Assets on site were ageing. EHV switchgear and transformers were replaced with two new units able to transform more load. The replacement of the HV switchgear will follow.
Customer benefits: Out of an abandoned old power station site comes the sleek lines of a modern indoor substation. Extra planned load increase has been taken into account to benefit the local customers.

Innovation Projects in the South West

Electric Nation

Electric Nation is the world's biggest electric vehicle project, running throughout the WPD area. The main aim is to investigate the use of Electric Vehicles (EVs) and their impact on the electricity network. It will trial an innovative managed charging system allowing control over charging at peak times.

As the EV market increases in the UK, WPD is looking to:

- understand the effects on the network of charging various vehicle and battery types
- understand how vehicle usage affects charging behaviour
- evaluate the reliability and acceptability to owners of EVs of demand control services and the influence these have on charging behaviour.

Participating EV owners will be trialling a smart charging system that will control the demand from electric vehicles in the event of their load on the local electricity network being too high.

The project began in April 2016 and will run until October 2019. For more details please visit the website: www.electricnation.org.uk

Equilibrium

The focus of Network Equilibrium is to balance voltages and power flows across the distribution system to better configure the network. The project uses three methods:

- **Enhanced Voltage Assessment (EVA)**
  This develops a new network modelling tool for 33kV and 11kV networks. It allows better visibility of time series power flows and voltage profiles at 33kV and 11kV.
- **System Voltage Optimisation (SVO)**
  SVO will dynamically adjust 33kV and 11kV voltage profiles within the trial area. It will overcome the issue of fixed voltage points at key substations by using telecommunications and centralised network management software.
- **Flexible Power Links (FPL)**
  The project will trial the use of novel power electronics to optimise the power flows between two different 33kV networks. Flexible Power Links will be used for the first time by a GB Distribution Network Operator and will transfer both real and reactive power flows, on a dynamic basis, between previously unconnected networks.

The project is developing solutions that will be demonstrated across Somerset and Devon and is running from March 2015 until June 2019. More information is available at www.westernpower.co.uk/NEquilibrium

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Western Power Distribution (East Midlands) plc, No2366923

Western Power Distribution (West Midlands) plc, No3600574

Western Power Distribution (South West) plc, No2366894

Western Power Distribution (South Wales) plc, No2366985

Registered in England and Wales, Registered Office:
Avonbank, Feeder Road, Bristol BS2 0TB