

Western Power Distribution



Overview

Western Power Distribution (WPD) is the licensed electricity distribution company serving some 2.5 million households across South West England and South Wales. It operates over 80,000 km of overhead lines and underground cables and more than 90,000 substations, ranging from very small units “at the bottom of the garden” and on poles, to several hundred major substations of 33,000v and 132,000v.

These distribution system assets are impacted by a wide range of weather events and by climate change including;

- Wind loading on overhead lines in extreme storms.
- Lightning, wind blown debris and falling trees/ branches cause faults and supply interruptions
- Floods could damage substations and require lengthy reconstruction
- Future increases in temperatures will reduce some equipment ratings

Following the floods in Carlisle in 2005, the Government asked electricity network companies to assess the flood risk to major substations. In the aftermath of the floods affecting South Yorkshire, the Midlands and Gloucestershire in 2007, Government sought proposals for a programme of flood mitigation works and WPD worked with the other operators through their trade body, the Energy Networks Association, to develop industry guidance. This collaborative work was undertaken in partnership with Environment Agency, SEPA (its equivalent Scottish body), Department for Energy & Climate Change (DECC), The Met Office and the industry Regulator, Ofgem. The guidance produced was accepted and WPD proceeded with developing site specific flood risk assessments and proposed solutions, using specialist flood risk contractors. Depending on the projected depth of flood water on a given site, the solutions ranged from:

- protection of individual items of equipment on a site
- protection of buildings
- perimeter protection
- in extreme situations – possible relocation

Adaptation measures

In the case of WPD's major substation site at Exeter, work was already needed to replace an old 33,000 volt switchboard, entailing the construction of a new building - so the opportunity was taken to design in flood mitigation by elevating it above flood level. The photograph on page 1 shows the old and new housings. The marginal cost of this approach was substantially cheaper than other functionally equivalent options.

The example described above represents just one strand of WPD's work on adaptation; there are many others, including:

- Engagement in collaborative research with the Met Office to use the climate change data from the UK Climate Projections 2009 (UKCP09) and other sources to assess impacts on future equipment ratings, specifications and frequency of specified weather events that would cause faults and supply interruptions
- Working with partners via their trade body, Ofgem, DECC, DEFRA and Cabinet Office on Adaptation to Climate Change Reporting, and assessment of risks from natural hazards
- Research into future vegetation growth patterns that will affect trees growing close to overhead lines, and the mitigation measures available
- Changing design of new substations and equipment to make them more flood resilient
- Close engagement with Environment Agency consultations on Shoreline Management Plans, which look at proposed future policy for coastal flood defences and the impact of climate change on them

Benefits of adapting

There are a range of benefits from taking a pro-active position in assessing climate change risk and impacts, including:

- It can identify least cost mitigation solutions – the example above on the Exeter substation would have cost many times more to achieve the same functional result had WPD not considered flood risk mitigation at the same time as normal asset replacement
- It can help discharge legal responsibilities; in WPD's case relating to continuity of supply
- It is an element of corporate risk assessment and a component of asset management, such as covered in British Standards Institute (BSI) Publicly Available Standard PAS 55

Collaborative working with partners subject to common types of risks, regulation and legislation is enormously beneficial in sharing cost, expertise and in gaining recognition and approval by Government.

Challenges

For a number of climate change risks (e.g. lightning activity), the information is not currently available out of UKCP09. In other cases, such as shoreline management plans (SMPs), the programme of work by others may take several years to produce a UKCP09 based output.

In some cases the climate change impact, for example a reduced rating, may be mitigated or exacerbated by changes in customer demand behaviours. Such situations are very unlikely to justify early action when applying a financial net present value approach. Where this situation occurs, WPD would look at the timescales over which the change in climate change impact and related customer behaviour would appear and identify a range of timescales which would then be available to apply alternative mitigation strategies.

Recommendations

- Others are in the same or similar situation – find them, work with them.
- Use trade bodies
- Advice is available on using climate change information – e.g. UKCP09 www.ukclimateprojections.org.uk/
- As part of normal day to day new build and asset replacement, consider whether there is a cost efficient opportunity to build in mitigation e.g. for flood risk, or efficiency e.g. building to BREEAM (Building Research Establishment Environmental Assessment Methods) standards
- Accept that some information may not yet be available, but start thinking about the range of timescales and options that would be available when it is

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