Telecoms Resilience

Safety, Reliability and Resilience Working Group

Date 7th April 2020

WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

westernpower.co.uk

ENA Strategic Telecom Group Position

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

The UK Energy Sector is seeking to implement a 'Smart Grid' future and is working with Government and Regulators to raise the profile of telecoms to ensure that it has the appropriate resources and funding available to make this possible.

In so doing it has noted the critical importance of spectrum access to facilitate Government commitments to net Zero and ultimately deliver the energy transition contemplated by Government and demanded by UK Plc.

Telecoms To Date

Operational Telecoms in last 30 years has been based on a technology mix:

- Fibre
- Micro-wave
- Radio (PMR)
- PSTN
- Satellite
- Airwave
- 2G & 3G

- Now we are moving into an era where comms (voice & data) is becoming increasingly critical

Criticality

- National Grid, generators, DNOs need to communicate using both voice and data
- DNOs and customers need to communicate, predominantly voice but increasingly using data that includes social media
- DNOs as a category 2 responder under the Civils Contingency Act need to communicate with LRFs and other Cat 1 & 2 responders
- DNOs need comms to their in-field assets for varying degrees of criticality, daily operation through to high impact low probability events, examples being:
  i. Remote switching, protection systems
  ii. Critical national infrastructure, Blackstart, Rota Load Disconnections, ESEC etc.

Currently

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

- Comms is robust in terms of day to day operation, resilience and business continuity
- DPCR5 and ED1 has seen Blackstart investment to protect UK plc electricity assets from batteries draining, generators installed to do the same
- These investments supporting a technology mix (e.g. fibre, micro-wave, radio) allow the electricity industry to stand alone and operate when the power is off, either locally or nationally
  - Example, power off = 2G, 3G, commercial fibre all off
  - Contingency = Satellite, Radio, private fibre, microwave, PSTN all on

ED2 Two Areas of Risk

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

Digitalisation

- New asset owners encouraged to market e.g. IDNOs, generators, storage providers, flexible solutions etc.
- Move to localised grid
- Network operations increasingly reliant upon data and exchange of data
- More connected assets required

Resilience

- Increased reliance upon electricity networks and the comms that support electricity networks
- DNOs do not and cannot rely on commercial provided networks as they are not resilient to power failure
- Localised grid increases the number of critical assets
- Telecom providers are switching off PSTN, the back bone of UK plc comms

A changing landscape, challenging current technology and threatening resilience

The Future (Strategy in progress….)

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

- More connected electricity assets
- More IP enable switchgear and protection
- An increased in the number of critical assets
- A changing technology mix of comms
- A utility wireless network resilient to power failure
- Increased use of dark fibre
- Government aspiration for asset sharing
- Solutions to replace PSTN for business use
- Solutions to replace PSTN for 105, PSR and customer use
- Solutions to replace Category 2 (CCA) data and voice comms
- All operational solutions to be cyber secure
- Support Net Zero

Resilient Wireless Comms & Net Zero

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

- In the Republic of Ireland spectrum has been awarded for energy industry use

  "Smart Grids are a key component of government efforts to meet demand for increased energy requirements in a cost effective and secure way while reducing the environmental impact of consumption and associated carbon emissions."
- German utilities have requested spectrum access
- Ofcom are undertaking a UK study to consider the spectrum access needs of the UK Energy Utilities.
- Cabinet Office have recently engaged with ENA to evaluate resilient wireless comms for blue light services
- DCMS have recently engaged with ENA to evaluate resilient comms

Why?

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

- The comms infrastructure has been “The blind spot!”
  - No thought of being resilient to power failure
- Good progress is being made
- We haven’t got all the answers yet
- They rely on Government policy to be a cost effective solution

Any Questions?

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

westernpower.co.uk

WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

UKPN – Tree Cutting

April 2020

Purpose

- To provide an overview to how UK Power Networks has approached tree cutting in RIIO-ED1

- To propose a new resilience metric for RIIO-ED2

Background

- In 2013 – UK Power Networks' innovation project looked at the viability of using satellite and LiDAR imagery to survey vegetation on HV OHL networks to assist more targeted tree cutting.
- The trial results were successful and indicated a substantial reduction in tree cutting workload and costs.
- LiDAR allows greater control of where to cut and better visibility of the state of the network.
- Contractor still responsible for securing permissions and cutting activities.

Network and Safety Benefits

The findings from the IFI trial showed that LiDAR could:

- Reduce on-foot vegetation surveys.
- More accurately and objectively assess which trees require cutting, thus reducing tree-cutting workload and costs.
- Provide cost savings of up to 20%, with reduced risk of safety incidents, and reduced impact on landowners including access to their lands.
- Identify low hanging conductors.

LiDAR Technology

- Laser technology creates a 3D image of a surface.
- Distance measurements between objects – e.g. vegetation clearance from overhead lines.
- Accurate geo-positioning of overhead line supports.
- Surveys at various heights. Using a fixed-wing plane, at 1600ft, no impact on landowners or livestock.

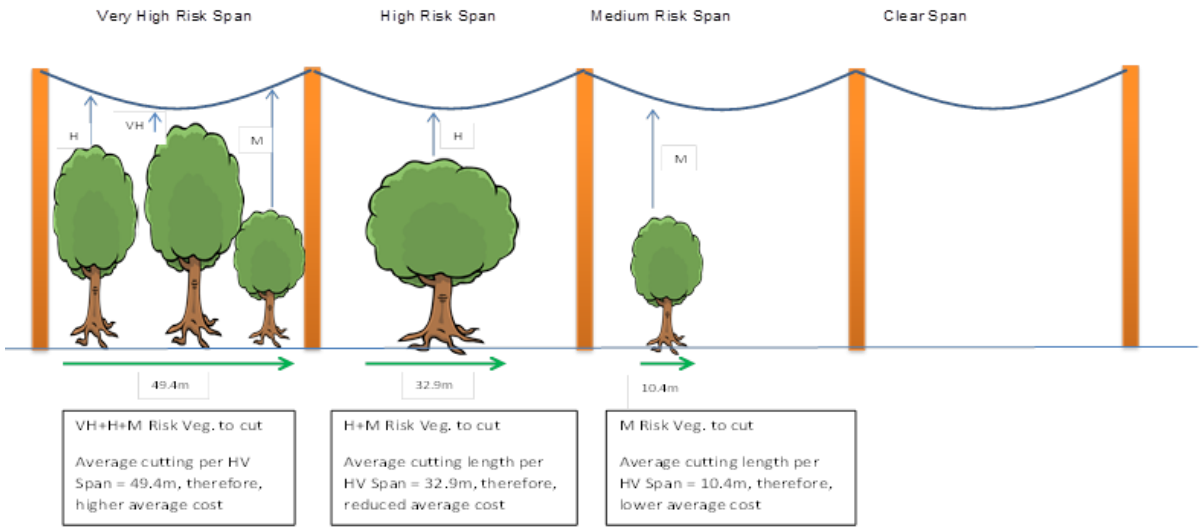
Images courtesy of Bluesky

UK Power Networks' use of LiDAR

UK Power Networks use LiDAR for:

- Proximity and direction of vegetation from OHL.
- Vegetation risk levels (VH, H, M and L).
- Linear length of vegetation at each risk level.
- Accurate geo-location of OHL supports.
- Span lengths / network lengths.
- Conductor height.
- Trees within falling distance.
- 3D virtual world, including high resolution photography.
- Data verification.

LiDAR – From IFI to BAU



The plan to cut the VH Risk spans in the first year results in a higher average cost initially as those spans contain more vegetation to be cut than spans containing only medium risk vegetation which will be cut later in the programme (the following slide shows the above lengths which are based on the LiDAR data). However, avoiding cutting the medium risk vegetation within the VH Risk Spans costs far more than the current cutting plan, as demonstrated in previous presentations.

- IFI trial led to contract for a LiDAR survey of the entire HV and EHV overhead line network.
- Results output in spreadsheet format.
- Data used to produce a risk-based cutting plan.
- A “virtual world” showed 3D visualisation of the network, along with associated high resolution photography.
- Added benefits realised – e.g. data accuracy.
- UK Power Networks incorporated LiDAR into business as usual activities.
- Shortlisted for IT Initiative of the Year Award in the Utility Week Awards 2015

Next Steps and benefits

Thoughts for ED2 – Resilience of networks to trees

- Could Tree Cutting be assessed on the basis of risk?

- With LiDAR now being used by most (all?) DNOs a simplistic unit cost approach may not be the best assessment tool

- Bringing in the level of risk on the networks and customer numbers has proved to be an efficient way of planning tree cutting programs for UKPN

- Developing a resilience metric would be more powerful than merely equating a level of expenditure with the “resilience” of each network as has been the case in RIIO-ED1 annual reporting