

Utility Arboriculture in the United Kingdom

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In the United Kingdom (UK), which comprises England, Scotland Wales and Northern Ireland, the electric utilities were privatized in 1989. Prior to that the utilities were state owned and functioned as 14 separate Regional Electricity Companies (RECs), some of which were referred to as electricity boards.

In England and Wales these were as follows: Northwest Electricity Board (NORWEB); North Eastern Electricity Board (NEB); Yorkshire Electricity (YE); Merseyside and North Wales Electricity Board (MANWEB); South Wales Electricity (SWALEC); Midlands Electricity Board (MEB); East Midlands Electricity (EME); Eastern Electricity; London Electricity; South Eastern Electricity Board (SEEBORD); Southern Electricity; and South Western Electricity Board (SWEB).

In Scotland there were two, i.e. Scottish Power and Scottish Hydro. In Northern Ireland there was one, Northern Ireland Electricity (NIE).

Since privatization there has been much change in the sector. The original 14 RECs in the UK are now owned by five distribution network operators (DNOs), three of which are British, (Scottish and Southern; Scottish Power; and Electricity



*Clearing an 11kV Line through a line of Poplars (*Populus spp*)*

North West) two are owned by US companies, (Pennsylvania Power & Light and CE Energy) and one is owned by a company from China, (UK Power Networks). Northern Ireland Electricity has been acquired by the Republic of Ireland's Electricity Supply Board (ESB). However, the old REC service territories are still intact and managed as individual "license areas" within the DNOs. All DNOs are required to report the separate license areas they own to the UK Regulator.

Transmission and Generation were also privatized and the old Central Electricity Generating Board (CEGB) is now known as Powergen, while all transmission is done by National Grid.

Regulation

In the UK, all DNOs are subject to regulation and the Regulatory Authority is known as OFGEM (Office of the Gas and Electricity Markets) which sits within the Department for Energy and Climate Change (DECC). There is no equivalent in Britain of the US Public Utility Commissions. The priority role of OFGEM is to "protect consumers by promoting competition, where appropriate, and regulating monopoly companies that run the gas and electricity networks". (It is also committed to energy security and curbing climate change and other work aimed at sustainable development). www.ofgem.gov.uk

OFGEM regulates the budgets of the DNOs. Budgets are set for five year periods that date from privatization in 1989. These are known as Distribution Price Control Review (DPCR) periods and they are numbered consecutively from the first between 1989 and 1993 (DPCR1) to the current period 2010 to 2015 (DPCR5). Budgets are allocated based on submissions from the

DNOs and OFGEM's analysis of the regulatory reporting data that each DNO submits each year.

Historic Utility Vegetation Management (UVM) in the UK

Before and up to privatization, tree and vegetation management had typically been undertaken by "in house" line crews, but since privatization it has largely been outsourced. Even though tree pruning was originally done by line crews, none of the old RECs employed professional arboriculturists or foresters as staff, and management was typically undertaken by line engineers, although from time to time some specialist arboricultural advice was sought externally. Budgets for tree maintenance were comparatively small and much of the work was reactive or associated with refurbishment work rather than proactive management of clearance cycles, although there was a small amount of cycle clearance work in one or two RECs.

The concept of managed cycles of tree clearance was not properly established in 1989 and this effectively carried on into the post privatization era in some, but not all, DNOs. This culture of relatively small tree pruning budgets, hot spotting and effectively no cycles of tree clearance resulted in the inevitable: in October 2002 a major storm caused serious power outages across the UK and left millions of customers off supply.

In 2002 the OFGEM had replaced the Electricity Supply Regulations (ESR) 1998 with the Electricity Safety Quality and Continuity Regulations (ESQCR 2002). The ESQCR 2002 placed significant legal obligations on all DNOs to maintain pre-defined minimum clearance distances between trees and overhead lines, with emphasis on both safety and continuity of supply, whereas the ESR's emphasis was on safety.



A 33kV overhead line through a commercial forestry plantation

The investigation into the storm of 2002 revealed that trees and vegetation were the principal reason for the outages. OFGEM concluded that DNOs had either, not managed trees and vegetation properly; or not managed them to an acceptable standard. OFGEM published a consultation document on the options for ways to ensure improvement and compliance with the ESQC Regulations. The consultation document cited not only the UK storm of 2002, but also the blackout in the north eastern United States and Canada in 2003 and a similar blackout in southern Germany and northern Italy in the same year, both of which were caused by trees.

OFGEM decided that the appropriate option to ensure proper vegetation management and compliance with ESQCR was to amend regulations to strengthen them and to place further unambiguous obligations on DNOs. In 2006 the ESQC Regulations were amended and are referred to as the ESQC(A)R 2006. The inclusion of Regulation 20A effectively extended the existing legal obligation to maintain minimum clearances not only for safety reasons but also to ensure continuity of supply (i.e. no tree related faults).

Regulation 20A: “A generator or distributor shall, so far as is reasonably practicable, ensure that there is no interference with or

Poor planning, new trees planted directly underneath an overhead 11kV line

interruption of supply caused by an insufficient clearance between any of his overhead lines and a tree.”

As part of the changes, The Department for Energy and Climate Change (DECC) strengthened the requirement to follow the industry tree clearance standard, i.e. the Electricity Networks Association (ENA) Technical Specification (TS) 43-8¹. This is reflected in the ESQC(A)R 2006 guidance document which states that “**....duty holders will operate progressive vegetation control programs in accordance with...ENA TS 43-8.**” In summary, the two main changes that are required for DNOs to demonstrate compliance with the ESQC(A)R 2006 are:

All overhead lines must have sufficient tree clearances maintained to ENA TS 43-8 as a minimum standard (already an existing requirement for safety, enforceable for supply continuity) from January 31, 2009, which effectively means ‘no tree related outages’.

Progressive resilience clearance (storm hardening) on the HV and EHV overhead line networks will be undertaken on critical lines (strategic overhead line routes) as prioritized by ENA Engineering Technical Report (ETR) 132² from January 31, 2009 onwards.

These are not optional for DNOs; they are Statutory Obligations, i.e. legally binding and enforceable with substantial penalties for failure to comply. ►

¹ Energy Networks Association (ENA) Technical Specification (TS) 43-8 “Overhead Line Clearances”

² Energy Networks Association (ENA) Engineering Technical Report (ETR) 132 “Vegetation management near electric overhead lines for the purpose of improving network performance under abnormal weather conditions”



Implications for UVM in the UK

The time the ESQC Regulations were introduced in 2002 was close to the start of the fourth distribution price control review (DPCR4). Therefore, in DPCR4 higher budgets were allocated to tree and vegetation management and UVM stepped up a gear or two. The result of the increased spending in all DNOs and across all license areas in England, Scotland, Wales and Northern Ireland, (see below) was an increase in the size and number of Utility Arboricultural Contractors and a thriving network of sub-contractors.

A major outcome of these changes is that the Utility Arboriculture Sector is thriving as investment from the DNOs increased. This is good news for the suppliers, i.e. the cutting and surveying contractors and their equipment suppliers. It is also good news for the Arboricultural Industry in general and a representative trade organization, the Utility Arboriculture Group (UAG) has been formed within the umbrella of the Arboricultural Association (AA) and has become the *de facto* representative trade organization for the utility sector.

The UAG started small and held its early annual meetings as part of the AA Annual Amenity Tree Conference. However since 2009, the UAG has held a separate 'stand alone' two-day Utility Arboriculture Conference in July of each year. The third UAG Conference is scheduled for July 11-12, 2011 at Bosworth Hall Hotel in Warwickshire with the theme of '*Looking Beyond the problem*', (www.trees.org.uk/training-events/Utility-Arb-Conference)

The UAG membership includes not only the electric utilities but also gas, water, and rail and it has begun to forge links with the UAA having had speakers from the UAA address the 2009 and 2010 conferences.

DPCR5 and Beyond

In the UK, we are in the second year of the DPCR5 period. One of the most significant changes between DPCR4 and DPCR5 is the budget allocated to the 14 license areas for tree and vegetation management. The annual budget across all 14 license areas has increased from GB£87 million (\$140 million USD) in DPCR4 to GB£134 million (\$215 million USD) per year in DPCR5. This represents significant investment and many of the DNOs have awarded long term contracts to their external contractors, typically guaranteed five-year contracts, with options to renew for a further five years.

This has brought a great deal of stability to the contracting sector and facilitates that sector investing in people, plant, and machinery to become more cost effective. However, two DNOs have opted to bring some or all of the UVM activities "in house" and run them directly. Whether or not this results in greater efficiencies and/or lower costs, remains to be seen.

Sometime soon all the DNOs representing the 14 license areas will have to enter into discussions with OFGEM about budgets for the DPCR6 period, which starts from April 2015 and could run for eight years, not five as has been the situation for the last five regulatory periods. OFGEM is seeking more information from the DNOs on their vegetation management programs and the efficiency of delivery. As the spending increases significantly from DPCR4 to DPCR5, OFGEM expects budgets to reduce in DPCR6 and beyond as the proactive vegetation management programs take effect and cycles of clearance are completed. Once the first and second cycles are completed then the programs should be more maintenance than active cutting and therefore the budgets should begin to reduce.

With over seven years of reporting (since the start of DPCR4), OFGEM feels confident that the DNOs can begin to forecast their workloads in future years with a reasonable degree of accuracy. However, there are major differences between DNOs in how they set up, manage, and run their UVM programs so like comparisons may still be difficult without some proper and effective UVM Benchmarking across all 14 license areas to normalize the data. This is an area of some debate and discussion at the present time, which hopefully will be resolved in the near future.

Other Developments

With the likely emphasis on reducing budgets in DPCR6 and beyond and the problems being experienced in tree clearances in some DNOs, there have been research initiatives into possible areas to improve efficiency and cost effectiveness. In the UK, OFGEM runs an Innovation Fund Initiative (IFI) to fund research. Effectively this encourages research into any aspect of transmission and distribution which is innovative and could (i) result in significant improvements in transmission and distribution; (ii) significantly improve the service to customers; (iii) help curb climate change and deliver sustainability; (iv) improve or enhance cost effectiveness and deliver significant efficiencies; etc. Typically a number of DNOs collaborate on projects and partner with private industry and universities. The IFI scheme allows participating DNOs to recover 80 percent of the research costs from their regulated budgets, which is a significant inducement.

Research that is currently underway in the area of UVM includes a major study of tree growth rates post pruning and how re-growth rates might be affected by climate change using the UK Climate Impact Projections (UKCIP 2009)³.



A mature oak adjacent a 33kV Line

This will provide useful, if not vital, information to facilitate forward planning of UVM programs. Four DNOs and National Grid are participating in this project which is due to report this year (2011). As we all know, cycles of tree pruning should be based/driven by the growth rates of the most commonly occurring species on our overhead networks.

Another area of research is that of the effectiveness of the tree growth regulator (TGR) Paclobutrazol (PBZ) in the UK. Although this compound is commonly used by utility companies in the USA and Canada it has not been used in the utility sector in the UK. However, PBZ is licensed for use in the UK on apple, pear, plum, and cherry trees. Initial research in the UK has shown that it is effective in slowing the growth rates of Ash, (*Fraxinus excelsior*), European Lime (*Tilia x europea*), Sycamore (*Acer pseudoplatanus*) and Leyland Cypress (*Cupressocyparis leylandii*)⁴.

In 2009 an IFI funded project was initiated involving five DNOs covering 11 license areas to expand this research to include the 10 fastest growing species in the UK that affect overhead power lines. The five-year research project is led by the FA Bartlett Tree Research Lab at Reading University. Although data is available only for one post treatment growing season so far, the results are encouraging. If PBZ is shown to be effective in the UK, the intention is to apply for a license to use it on amenity trees.

The use of PBZ would save DNOs a

lot of money in bringing cycle busting trees into the clearance cycles, bringing trees for which the owners will only allow minimal cutting into the cycles and providing time for the DNOs to plan the conversion of the overhead LV conductors to aerial bundled cable or placing them underground to reduce conflicts with trees, by slowing the growth rates down and extending the cut cycle.

Research is being undertaken to investigate the possibility of developing a system for assessing trees to predict the likelihood of failing in extreme adverse weather conditions. This is aimed at the resilience obligation placed upon DNOs to “storm harden” their overhead networks. This research has just begun and will run for two years.

Another significant development that has occurred in the UK is the publication in September 2008 of the second edition of the Energy Networks Association Engineering Recommendation G55/2 *Safe Tree Working in Proximity to Overhead Electricity Lines*. This guidance allows more work to be done with the lines energized under certain specific conditions. This is a step

forward for the industry in the UK, as before this most of the trees work in proximity to overhead conductors had to be done with the lines de-energized. Obviously each DNO has its own interpretation of G55/2 and its own guidelines for implementation, but more work will take place with the lines energized.

What the Future Holds

Undoubtedly the future is looking good. The recent changes have resulted in the utility arboriculture industry in the UK “coming of age” so to speak. The increased spending and longer term contracts have led to (i) the emergence of large contracting companies to undertake the outsourced UVM work; and (ii) to the emergence of the UAG as a “stand alone” industry representative body and an increase in its influence. The publication and implementation of G55/2 will lead to more live line working. What is now required is that we in the UK engage more with our colleagues in the US and Canada and learn from their experiences and look at industry best practice in the US and Canada and import those into the UK adapting them to UK conditions as appropriate. We need to look outwards and engage with the UAA and bring utility arboriculture in the UK forward to new levels of management, efficiency, and productivity.

In the UK, we can look forward to eight years or more of reasonable budget spending in the UVM sector. We must use that time wisely to undertake essential research and put in place effective UVM management processes to ensure the continuity of the highest standards of utility arboriculture for the foreseeable future. We also need to use the time to engage with our customers and stakeholders to educate them about planting the right trees in the right places.

³ Murphy *et al*, (2009) UK Climate Projections Science Report, Meteorological Office, Hadley Centre, Exeter, England

⁴ Hotchkiss, D (2003) A study of the effects of Paclobutrazol on the Growth Rates of Fast Growing Tree Species in the United Kingdom & Ireland, MSc Thesis, University of Central Lancashire, Preston, England