EXPLANATORY MEMORANDUM TO

THE ELECTRICITY SAFETY, QUALITY AND CONTINUITY (AMENDMENT) REGULATIONS 2006

2006 No. 1521

1. This explanatory memorandum has been prepared by the Department of Trade and Industry and is laid before Parliament by Command of Her Majesty.

This memorandum contains information for the Joint Committee on Statutory Instruments.

2. Description

2.1 These regulations amend and extend the scope of the Electricity Safety, Quality and Continuity Regulations 2002 ("ESQCR") (SI 2002/2665). The ESQCR regulate power quality and supply continuity requirements, to ensure an efficient and economic electricity supply service to consumers, as well as specifying safety standards which are aimed at protecting the general public and consumers from danger.

3. Matters of special interest to the Joint Committee on Statutory Instruments

3.1 None

4. Legislative Background

4.1 The relevant primary legislation is the Electricity Act 1989 (as amended by the Utilities Act 2000 and the Energy Act 2004). The present regulations, made under sections 29, 30(3) and (3A) and 60 of the 1989 Act, amend and extend the scope offshore of the Electricity Safety, Quality and Continuity Regulations 2002 (SI 2002/2665), which came in to force on 31 January 2003.

4.2 The amendments address 4 issues:

a. To reflect the latest amendment to British Standard Requirements for Electrical Installations (BS7671) following the harmonisation of cable core colours across the EU;

b. To ensure that electricity networks relating to tramways and trolley vehicle systems are afforded the same exemptions from regulation by the ESQCR as are enjoyed by railway networks;

c. To improve electricity network resilience to adverse weather conditions by requiring the management of foliage near overhead lines to prevent interference with or interruption to supply. This amendment will apply to generators and distributors from 31 January 2009 to allow those parties time to ready their operations for this increased responsibility, and

d. To ensure that the ESQCR public safety requirements apply to offshore as well as onshore generating installations. The offshore installations are those located (or to be located) in GB territorial waters or the UK Renewable Energy Zone ("REZ"). The REZ was designated in December 2004 and a UK Hydrographic Office map showing its extent is appended to this Explanatory Memorandum.

5. Extent

5.1 This instrument applies to Great Britain.

6. European Convention on Human Rights

As the instrument is subject to negative resolution procedure and does not amend primary legislation, no statement is required.

7. Policy background

7.1 Since the Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR) came into force on 31 January 2003 to improve safety and supply reliability standards of electricity networks, important issues have arisen that necessitate amendments.

7.2 The UK storms in October 2002, which resulted in circa 2 million domestic consumers losing supplies for up to 10 days, highlighted the need to improve electricity network resilience in adverse weather conditions. Subsequent investigations have shown that the proximity of trees and branches to overhead lines is the one overriding factor that needs to be addressed to improve network resilience.

7.3 Trees coming into contact with overhead power lines were also a key factor in the major blackouts affecting circa 50 million consumers on the east coast of the USA and Canada in August 2003, and a similar number of consumers in Italy in September 2003. It was therefore proposed that a new obligation be imposed upon generators and distributors of electricity to ensure, so far as reasonably practicable, that no interference with or interruption of supply is caused by an insufficient clearance between their overhead lines and trees. This obligation would augment the existing obligation, under regulation 18(4) of the ESQCR, for generators and distributors to prevent, so far as reasonably practicable, overhead lines coming so close to, amongst other things, trees, as to cause danger.

7.4 The new requirement to harmonise cable core colours across the EU has resulted in an amendment to BS7671 (also known as the IEE Wiring Regulations 16th Edition).

7.5 The special nature of overhead traction supplies was recognised in the drafting of the original ESQCR since railway networks were exempted. Such networks are instead regulated under the Railways Act 1993 (as amended). However, further clarification is required to ensure that tramways and trolley vehicle systems are afforded the same exemption from the ESQCR as for railways.

7.6 The push for increased renewable energy generation has resulted in offshore generating stations becoming a reality, and numbers of such installations are expected to expand considerably in the coming years. It is important that regulations to ensure public safety and address the risks of supply interruption apply equally offshore, in GB territorial waters and the REZ, as well as onshore.

7.7 A formal consultation process into the proposals was launched over the period from June to September 2005. Responses were received from a wide cross-section of groups including the electricity industry, trade associations, arboriculture, forestry, landowners and consumers. There was broad support for the proposals relating to updating references to BS7671 and exempting tramway and trolley vehicle systems from the regulations. However, there was a mixed response towards the proposals for vegetation management and offshore installations.

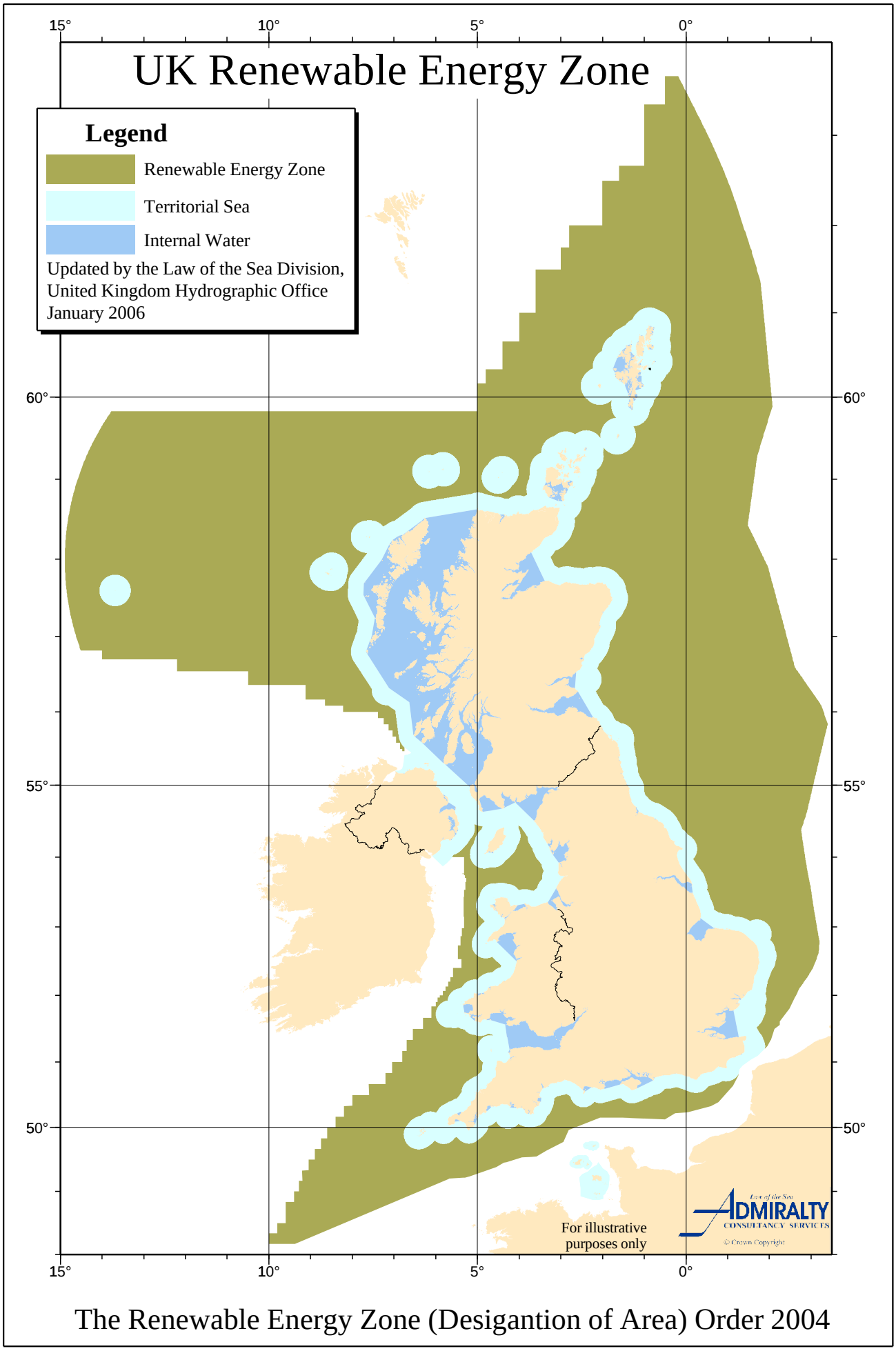
7.8 In light of the responses received during the public consultation, the vegetation management and offshore proposals were further refined and several key stakeholders were consulted informally over the period to the end of April 2006. The result was a much broader level of support across all sectors, which include industry, government, arboriculture, and forestry. Further information is contained within section 5 of the attached Full Regulatory Impact Assessment.

8. Impact

8.1 A Regulatory Impact Assessment is attached to this memorandum.

9. Contact

Peter Vujanic at the Department of Trade & Industry Tel: 020 7215 5599 or e-mail: peter.vujanic@dti.gsi.gov.uk can answer any queries regarding the instrument.



The Renewable Energy Zone (Desigantion of Area) Order 2004

FULL REGULATORY IMPACT ASSESSMENT

Publication Reference URN 06/1295

THE ELECTRICITY SAFETY, QUALITY & CONTINUITY (AMENDMENT) REGULATIONS 2006

Engineering Inspectorate, DTI
7 June 2006

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1. EXECUTIVE SUMMARY

1.1 The Electricity Safety, Quality and Continuity Regulations 2002 [the ESQCR] came in to force on 31 January 2003 and replaced the Electricity Supply Regulations 1988 (as amended).

1.2 The ESQCR specify safety standards, which are aimed at protecting the general public and consumers from danger. In addition, the Regulations specify power quality and supply continuity requirements to ensure an efficient and economic electricity supply service to consumers. The requirements of the Regulations apply to

public and private operators and to electricity networks used to supply consumers in England, Scotland and Wales.

1.3 Since the ESQCR came into force a number of issues have arisen that necessitate amendments:

1. **BS7671 – British Standard Requirements for Electrical Installations**

There are several references to this standard within the ESQCR. In light of the requirement to harmonise cable core colours across the EU and the need to update the standard to incorporate the requirements posed by the ESQCR, this British Standard has since been amended further, and the ESQCR must reflect this.

2. **Tramways, Trolley Vehicle Systems, and other modes of Guided Transport**

The special nature of overhead traction supplies was recognised in the drafting of the ESQCR since railway networks were exempted from the definitions of 'consumer' and 'distributor' in regulation 1(5), which refer to the 'operator of a network within the meaning of Part I of the Railways Act 1993'. However, various bodies, such as HM Railways Inspectorate and the Confederation of Passenger Transport UK, have asked that the Regulations be amended to afford tramways and trolley vehicle systems the same exemption as for railways. Consequently, further clarification is necessary.

3. **Vegetation Management in proximity to Overhead Line Networks**

The UK storms in October 2002, which resulted in circa 2 million domestic consumers losing supplies for up to 10 days, highlighted the need to improve electricity network resilience in adverse weather conditions. Soon after these storms, the then Energy Minister commissioned an investigation into electricity company performance. The subsequent report highlighted, amongst other things, that some companies were not as effective at mitigating the risk of faults caused by trees as other companies. The Network Resilience Working Group was set up to take forward the recommendations from the original investigation and agreed that the one overriding factor that needs to be addressed to improve the network performance in storms is by improving the management of trees and branches in proximity to overhead lines.

Trees coming into contact with overhead power lines and poor company vegetation management practices were also significant factors in the major blackouts affecting circa 50 million consumers on the east coast of the USA and Canada in August 2003, and a similar number of consumers in Italy in September 2003. Reports following the US/Canada[1] and Italy[2] incidents have also been studied for any learning points that can be adopted here in the UK.

4. **Renewable Energy Zones (REZ)**

[1] Final report into overall incident available on Natural Resources Canada website at: http://www.nrcan-rncan.gc.ca/media/docs/final/finalrep_e.htm and US Federal Energy Regulatory Commission report on vegetation management available at: http://www.ferc.gov/cust-protect/moi/uvm-final-report.pdf

[2] Available at: http://www.ucte.org/pdf/News/20040427_UCTE_IC_Final_report.pdf

Offshore generating installations are now a reality. The first commercial scale offshore wind farm at North Hoyle has been operational for over a year. It is expected that the offshore renewable energy sector will expand considerably in the coming years with more generating stations both in territorial waters and beyond in the UK's REZ. It is important that regulations to ensure public safety and address risks to interruption of supply apply equally offshore as well as onshore. In respect of offshore generating installations, section 94 of the Energy Act 2004 allows for regulations to relate to supply and safety in the territorial sea or the REZ. As this offshore activity was not addressed specifically when the current ESQCR were drawn up, it is now appropriate to extend the scope of these Regulations under new Energy Act powers to include the REZ and the territorial sea.

1.4 The analysis detailed later in this Regulatory Impact Assessment document has led to the following recommendations:

1. BS7671 Amendment No2 and Renewable Energy Zones

It is recommended that the proposals associated with these issues also be adopted, as the costs and risks are not considered to be significant and they will enable the ESQCR to keep pace with changes in the electricity markets.

2. Tramways, Trolley Vehicle Systems, and other modes of Guided Transport

As the costs and risks are also considered to be insignificant, it is also recommended that the proposal associated with this issue also be adopted to ensure such vehicle systems enjoy the same exemptions as for Railways.

3. Vegetation Management

The risks relating to vegetation management in proximity to overhead line networks are considered to be significant and are studied in further detail. Table 1 overleaf gives a brief summary of the relative merits of each of the four options considered.

The assessment has indicated that Options 2, 3 and 4 are very similar in terms of cost. Based on the assumptions and evidence produced in this document, it is felt that Options 3 and 4 will be much more effective in delivering the improvements sought in network reliability and resilience, as the issues of industry participation and enforcement are better addressed. Of the two options, Option 4 is the most preferable as it best addresses the environmental and social impacts considered elsewhere.

It is, therefore, recommended that Option 4 be adopted to enable full implementation and enforcement of supply continuity requirements in modern electricity markets.

Table 1 – Vegetation Management - Relative merits of each option discussed

	Comments

Option 1 Do nothing	• Stronger and more frequent winds may be present in future. • Tree growing season increased. • Probable deterioration in electricity supply resilience in storms.
Option 2 Voluntary code of practice	• Some improvement in network resilience possible. • Full participation not guaranteed – previous experience would suggest that companies do not necessarily act on voluntary recommendations (i.e. Baldock Report 1982). • Enforcement unavailable.
Option 3 Amend ESQCR	• Enables companies to progressively bring about improvements sought via tailor made programmes that focus on specific barriers. • Number of faults caused by trees in non-storm conditions may be reduced by circa 900 pa. • Likely to save hundreds more tree related faults in storm conditions. • Initial cost to Industry of circa £17.3m pa. Equates to an increase of circa 0.1% on consumers' electricity bills. • Estimated benefits to industry from increased resilience likely to reach £12.33m pa after 25 years. • This reduces net cost to industry to circa £4.75m pa after 25 years. • Enforcement available and full participation assured. • Estimated cost to DTI for arboricultural expertise in monitoring Network Operator compliance ranges from £5k to £20k on a bi-annual basis. • The initial formal review of the proposals likely to cost DTI in region of £20k in 2011.
Option 4 Amend ESQCR supported by code of practice	• Benefits as highlighted for Option 3 above, PLUS • Allows the opportunity for all stakeholders to be involved in the drawing up of such a standard. • Ensures consistent approach when implementing vegetation management programmes and should help mitigate any of the possible risks of damaging relations with landowners, local authorities and the public. • Code of Practice offers clarity to Network operators in terms of how they can comply with the new statutory requirement in practice.

2. PURPOSE AND INTENDED EFFECT OF MEASURES

2.1 OBJECTIVES

There are 4 areas that the proposed amendments to the Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR) seek to address:

- To update references to BS7671,

- To more clearly exclude trams, trolleybuses and other modes of guided transport from the requirements of the ESQCR,
- To improve the resilience and reliability of overhead electricity distribution networks, and
- To extend the scope of the ESQCR in order to apply to offshore generating installations.

3. BACKGROUND

The ESQCR specify safety standards, which are aimed at protecting the general public and consumers from danger. In addition, the Regulations specify power quality and supply continuity requirements to ensure an efficient and economic electricity supply service to consumers. The requirements of the Regulations apply to public and private operators and to electricity networks used to supply consumers in England, Scotland and Wales.

The ESQCR replaced the Electricity Supply Regulations 1988 (as amended) and came into force on 31 January 2003. Since the new Regulations came into force, a number of issues have arisen that necessitate amendments:

3.1 BS7671 Amendment No2

Throughout the Regulations there are several references to 'British Standard Requirements'. These are, in fact, references to the British Standard Requirements for Electrical Installations BS7671[3]. In light of the requirement to harmonise cable core colours across the EU and the need to update the standard to incorporate the requirements posed by the ESQC Regulations, this British Standard has since been amended further by Amendment No2 (AMD 14905) March 2004.

The Institution of Engineering & Technology (formerly the Institution of Electrical Engineers) and the British Standards Institute have worked jointly on this amendment, together with the involvement of DTI and representatives from the electrical industry including the Energy Networks Association (ENA), the National Inspection Council for Electrical Installation Contracting (NICEIC) and the Electrical Contractors Association (ECA). An Impact Assessment is publicly available on the IET's website[4].

3.2 Tramways, Trolley Vehicle Systems, and other modes of Guided Transport

The special nature of overhead traction supplies was recognised in the drafting of the ESQC Regulations since railway networks were exempted from the definitions of 'consumer' and 'distributor' in regulation 1(5), which refer to the 'operator of a network within the meaning of Part I of the Railways Act 1993'. However, various bodies, such as HM Railways Inspectorate and the Confederation of Passenger Transport UK, have asked that the Regulations be amended to afford tramways and trolley vehicle systems the same exemption as for railways. Consequently, further clarification is necessary.

[3] British Standard Requirements for Electrical Installations BS7671: 2001 IEE Wiring Regulations 16th Edition ISBN 0 85296 988 0, 2001 (as amended by Amendment No1 (AMD 13628) February 2002).
[4] Title – 'Impact Assessment of Harmonizing the Identification of Cores in Cables and Flexible Cords' – URL: http://www.iee.org/Publish/WireRegs/Impact_2004.pdf

3.3 Vegetation Management

Currently, Regulation 18(5) places a continuous duty on electricity generators and distributors to maintain a safe distance between any overhead line and any tree, building or other structure where persons may be present to avoid danger so far as is reasonably practicable. In general, duty holders under the Regulations may demonstrate compliance with this requirement by complying with the Energy Networks Association's standard 43-8[5]. Duty holders also have powers under the Electricity Act 1989[6] to fell or lop trees that are or will be so close to obstruct or interfere with the installation, maintenance or working of the line or plant, or to be an unacceptable source of danger[7].

However, the UK storms of October 2002, and subsequent investigations, have revealed the need to augment this duty with a specific regulation for the cutting of trees for the purpose of maintaining supplies where reasonably practicable. Following the incident, the then Energy Minister commissioned British Power International (BPI) to investigate electricity company performance. A report[8] was subsequently published in December 2002, which highlighted amongst other things, that some companies were not as effective at mitigating the risk of faults caused by trees as other duty holders. The Network Resilience Working Group[9] (NRWG), which was set up to take forward the generic recommendations arising from the BPI report, agreed that 'there is one overriding factor today that needs to be addressed to improve storm performance and this is the proximity of trees and branches to overhead lines'. Consequently, the NRWG recommended that the DTI consider a revision to the ESQCR to include a duty 'to cut trees where reasonably practicable'. The Trade and Industry Committee commended the NRWG report[10].

Reports[11] following the US/Canada (August 2003) and the Italy (September 2003) blackouts have also been studied for any learning points that can be adopted here in the UK, as trees were found to be a major contributory factor in both incidents.

3.4 Renewable Energy Zones (REZ)

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[5] Energy Networks Association Technical Standard 'ENATS 43-8 Overhead Line Clearances – Issue 3' dated 2004.

[6] Electricity Act 1989, Schedule 4, Paragraph 9 – 'Felling and lopping of trees etc.'

[7] 'Danger' as defined in the ESQC Regulations includes danger to health or danger to life or limb from electric shock, burn, injury or mechanical movement to persons, livestock or domestic animals, or from fire or explosion, attendant upon the generation, transmission, transformation, distribution or use of energy.

[8] Department of Trade and Industry October 2002: Power System Emergency Post Event Investigation – Overview Report.

[9] Network Resilience Working Group is a joint DTI, Ofgem, Energywatch and DNO group, which was established in April 2003 to propose initiatives to improve the resilience of electricity distribution networks during severe weather events.

[10] House of Commons Trade & Industry Committee – 'The Electricity Distribution Networks: Lessons from the Storm of October 2002 and Future Investment in Networks'
http://www.publications.parliament.uk/pa/cm200405/cmselect/cmtrdind/89/89.pdf

[11] Report published by JESS, considered the blackouts that occurred in North America/Canada, Sweden/Denmark and Italy and possible implications for the UK.
http://www.dti.gov.uk/files/file10730.pdf

Offshore generating installations are now a reality. The first commercial scale offshore wind farm at North Hoyle has been operational for over a year. It is expected that the offshore renewable energy sector will expand considerably in the coming years with more generating stations both in territorial waters and beyond in the UK's REZ.

The present form of the ESQCR arguably applies already to the Territorial Sea adjacent to the constituent parts of the UK. However, section 94 of the Energy Act 2004 allows for regulations to relate to supply and safety in the territorial sea or the REZ. As this offshore activity was not addressed specifically when the current ESQCR were drawn up, it is now appropriate to formally extend the scope of these Regulations under new Energy Act powers to include the REZ and the territorial sea.

4. RATIONALE FOR GOVERNMENT INTERVENTION

4.1 BS7671 Amendment No2

There is no intention that the cable colours of existing installations be retrospectively changed to those of the new harmonised colours. Where there is an extension or alteration to an existing installation the installer may use the old cable colours until April 2006 or the harmonised cable colours with markings at the interface.

It is also believed that the changes will be particularly beneficial to the DIY sector as the new cable colours will relate to those found in flexes to appliances and cabling within equipment.

The impact assessment published on the IET website assesses that typically there are three or four fatalities each year in the UK associated with the electrical installations in buildings. These are generally associated with householders making contact with live parts either as a result of DIY repairs or picking up severed flexible cables. This would suggest that within electrical installations in buildings the UK is operating from a very safe base and care has to be taken to maintain this.

The levels of fatalities associated with working on electrical installations were also assessed and the risk was considered also to be low. BS7671 requires that installations are inspected and tested during work and on completion so that wiring is proven. Certificates are also issued to persons ordering the work.

4.2 Tramways, Trolley Vehicle Systems, and other modes of Guided Transport

It is believed that there are no further significant risks posed by the proposed amendment as tramways and trolley vehicle systems are already subject to other legislation, which is enforced by bodies such as the Health and Safety Executive and the Office of Rail Regulation.

4.3 Vegetation Management

4.3.1 The principal risks addressed by the existing ESQCR as a whole are two-fold – public safety and quality of supply. The public safety issue, in relation to the

management of trees in close proximity to electricity networks, is already addressed in the Regulations. Under Regulation 18(5), duty holders are required to maintain trees a safe distance from overhead line networks and, to ensure compliance with this requirement, they follow an industry code of practise (ENATS 43-8: Overhead Line Clearances – Issue 3, 2004). At present, the electricity companies are required to operate tree-cutting programmes with sufficient frequency to ensure that trees are kept clear of overhead lines in accordance with 43-8 and do not become a source of danger, for example due to children climbing trees near overhead lines. The Regulations, however, make no provision in relation to the issue of management of trees and supply reliability.

4.3.2 Concerning the interruption of supply issue, there have been 403 major supply interruptions reported[12] to DTI in the seven-year period 1 April 1998 to 31 March 2005. Of those reported interruptions, 29 interruptions (circa 7% of the total) have been positively confirmed as due to trees or wind blown debris. Indeed, this figure may be even higher as a further 60 incidents were reported as cause 'unclassified' or 'unknown'.

4.3.3 It is also worth noting that in cases of extreme weather related events, many companies apply for (and are subsequently granted) exemptions from reporting individual incidents to the DTI due to the excessive volume of data. Therefore, the figures quoted above give an indication of the effect of overgrown trees when the electricity networks are not subject to major storm incidents. This would also suggest that not all distribution companies are as effective as they could be when maintaining vegetation clear of overhead lines.

4.3.4 The Energy Networks Association[13] (ENA) compiles detailed fault data from its 'NAFIRS' reporting system, which includes extreme weather information. However, not all electricity companies have previously taken part in this reporting system. It is believed that the former Eastern Electricity and Seeboard Electricity companies (both now part of EdF Energy) did not take part from 1994 and 1999 respectively. In order to gain an understanding of the complete national picture in Great Britain, the data contained in tables 2 and 3 combine data received via NAFIRS with similar data obtained directly from the other non-participating companies.

[12] For an indication of the nature and scope of major supply interruptions reportable to DTI refer to Regulation 32 of the Electricity Safety, Quality and Continuity Regulations 2002

[13] Energy Networks Association - the trade association for electricity distribution/transmission in UK

Table 2 – Low Voltage Overhead Line Tree Related Faults – 1990-2005

	1990/1	1991/2	1992/3	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/00	2000/1	2001/2	2002/3	2003/4	2004/5	15 year total
Cause – Growing or Falling trees	3719	4058	5026	4481	2900	2802	3606	2964	4366	2783	3865	5455	4985	4352	6421	61783
Total - all causes	40288	32117	32831	31552	21072	18062	20910	18016	23153	18015	21645	26669	27938	23439	28852	384559
% faults due to growing/falling trees only	9.2	12.6	15.3	14.2	13.8	15.5	17.2	16.5	18.9	15.4	17.9	20.5	17.8	18.6	22.3	16.1

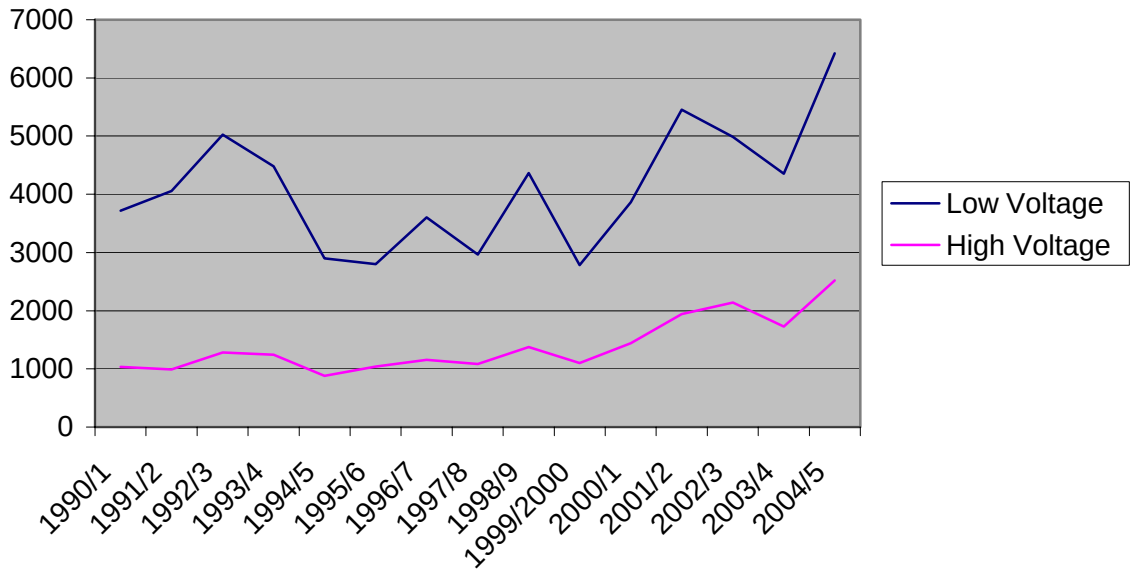
Table 3 – High Voltage Overhead Line Tree Related Faults – 1990-2005

	1990/1	1991/2	1992/3	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/00	2000/1	2001/2	2002/3	2003/4	2004/5	15 year total
Cause – Growing or Falling trees	1036	990	1281	1246	879	1039	1154	1086	1378	1103	1441	1944	2139	1727	2519	20962
Total - all causes	20497	16147	22102	18642	15767	15331	14127	15236	15957	14100	14971	17277	16051	15959	17459	249623
% faults due to growing/falling trees only	5.1	6.1	5.8	6.7	5.6	6.8	8.2	7.1	8.6	7.8	9.6	11.3	13.3	10.8	14.4	8.4

Note - High Voltage is defined as any distribution voltage between 1kV and 22kV for the purposes of this analysis.

4.3.5 Analysis of the data shown in tables 2 and 3 suggests that the trend of tree related faults at both low voltage (230V & 400V) and high voltage (between 1kV & 22kV) has increased significantly over the last 15 years. Although the figures for the period show some degree of volatility from year to year, Graph 1 below clearly shows the trend. Since 1994/5, low voltage faults due to growing or falling trees have increased by 121% and high voltage faults by 187%. In addition, the last complete year of data (2004/5) shows a marked increase in tree related faults compared with the previous year (47% increase at low voltage and 46% increase at high voltage).

Graph 1 - Distribution Network - Overhead Line Faults - Cause due to 'Growing/Falling Trees'



4.3.6 Taking only the last 5 years into consideration, one can also conclude that trees cause approximately 20% of all faults at low voltage and 12% of all faults at high voltage. It can also be concluded that the real figures may be higher still as a significant number of tree related faults might have been categorised as due to ‘windbourne materials’ or ‘wind and gale’. One DNO estimated that up to 20% of the faults classified as due to ‘wind and gale’ may actually be related to trees. Annex 1 shows a more comprehensive set of data over the period 1990-2005 for all distribution and transmission voltage levels.

4.3.7 The transmission network operators (TNOs) of Great Britain (National Grid, Scottish Power and Scottish & Southern Energy) were also asked to provide similar data, which is also contained in Annex 1. Over the same 15-year period, growing or falling trees caused a total of 12 sustained faults. To provide context, over the same period the overhead transmission network had experienced 1,909 faults. This means that tree related faults account for around 0.6% of the overhead network faults on transmission systems. This is not

surprising as steel towers on the transmission network are significantly larger than, say, wood pole supports on the distribution system, and the clearances prescribed by 43-8 increase significantly with voltage level. However, this needs to be balanced against the fact that the risks are greater as many more consumers could be impacted by any such event (for example, the US and Italian experiences in 2003 - paragraphs 4.3.20 B and C refer).

4.3.8 It is believed that there are several factors, which have contributed to the overall increasing trend in tree related faults in recent years. The list below is by no means exhaustive:

- The Foot and Mouth outbreak in 2001 did significantly hinder vegetation control programmes nationally for several months due to Network Operators (NOs) having difficulties gaining access. The ensuing backlog will have contributed to the overall number of tree related faults in subsequent years.

- A recent study by the Met Office[14] showed, amongst other things, that the growing season has increased and stronger and more frequent winds may become evident in Southern Britain.

- Increasingly, the public regards trees as having great amenity value and many are the pride and joy of the landowner. Although distribution companies and other expert bodies consider that roughly 80% of overhead tree cutting is fairly straightforward, the remaining 20% is challenging[15]. Landowners sometimes only allow companies to carry out 'restricted' cuts, which result in more frequent visits and higher costs.

- NOs feel that vegetation management contracts are more difficult to let, and the available tree management expertise is scarce due to an increase in demand for tree cutters in other market sectors (e.g. railways).

- Some NOs have not been as effective as others at undertaking vegetation management activities[16].

4.3.9 NOs do have statutory powers to cut trees in proximity to overhead lines where trees could obstruct or interfere with the lines or where trees constitute an unacceptable source of danger. These powers are contained in Schedule 4 paragraph 9 of the Electricity Act 1989 (as amended by the Utilities Act 2000).

4.3.10 It is apparent that few NOs actually invoke these powers in practice (only 3 tree lopping hearings have been held since the Electricity Act came into force in 1989), and even then the reasons are for public safety rather than network

[14] Met Office Report prepared for the Network Resilience Working Group: 'Extreme Weather Events likely to Cause Disruption to Electricity Distribution' – dated August 2003
[15] Source – NRWG Report 'Proposals for Improved storm Performance for Electricity Distribution Networks' dated December 2003.
[16] Source – DTI/BPI Report 'October 2002 Power System Emergency Post Event Investigation – Overview Report' - dated December 2002.

performance. The reluctance to use these powers stems from an aversion to the risk of escalating compensation claims or Wayleave[17] terminations by landowners.

4.3.11 Nonetheless, these statutory powers may present an opportunity to overcome some difficulties and could be used effectively in certain circumstances. Even where Wayleave terminations may be presented to NOs, there are statutory procedures that consider such situations.

4.3.12 There are special areas that are legally protected that can also limit the extent to which vegetation management can be carried out. These include:

National Parks and Areas of Outstanding Natural Beauty (AONB)
In England and Wales, these were created by the National Parks and Access to the Countryside Act 1949. The Countryside and Rights of Way Act 2000 added further regulation and protection in support of AONBs. The purpose of the designation is the conservation and enhancement of the natural beauty of the areas concerned. In England, these are designated by the Countryside Agency, and, in Wales, by the Countryside Council for Wales. In Scotland, National Parks are designated under the National Parks (Scotland) Act 2000 and responsibility for these rests with the Scottish Executive and Scottish Parliament.

Sites of Special Scientific Interest (SSSI)
These are designated areas of special interest by reason of their flora, fauna, geological or physiographical features under the Wildlife and Countryside Act 1981. In England and Wales, these are designated by English Nature and the Countryside Council for Wales respectively. In Scotland, these are designated under the Nature Conservation (Scotland) Act 2004 by Scottish Natural Heritage.

Tree Preservation Order (TPO)
This is an order made by a local planning authority in respect of trees within the Town and Country Planning Act 1990 in England and Wales, and the Town and Country Planning (Scotland) Act 2004 in Scotland. The order makes it an offence to cut down, uproot, prune, damage or destroy any single tree or group of trees that are protected under the legislation.

The electricity companies can obtain exemptions from TPOs if the trees are on operational land and where the work is necessary on safety grounds or to enable them to maintain their equipment. Any tree works carried out in accordance with a notice issued under paragraph 9 schedule 4 of the Electricity Act 1989 are also exempt.

4.3.13 The electricity companies also benefit from similar exemptions from the need to obtain felling licences under the Forestry Act 1979 (which is enforced by the Forestry Commission).

[17] A Wayleave is a legally enforceable agreement between a landowner and electricity company for placing electrical equipment on or over land.

4.3.14 There will always be some impact on amenity and aesthetic values when trees are cut. The impact may be more pronounced in environmentally sensitive areas such as National Parks and AONBs, which are protected for the natural beauty of their landscapes and, additionally for National Parks, the opportunities for outdoor recreation they provide. To minimise this impact, DNOs and their contractors are expected to:

- Consult National Park Authorities and, for AONBs, relevant local authorities or AONB Conservation Boards on proposed tree cutting, and
- Ensure the highest standards of arboricultural practice in these areas.

This ensures that they are properly complying with their statutory duties to have regard to these areas in carrying out work affecting them.

4.3.15 There may also be some impact on wildlife such as birds, when trees are either removed or trimmed back away from overhead lines. However, there is much guidance and legislation (such as the Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act 2000), which serves to protect rare breeding birds during the nesting season.

4.3.16 Where activities may affect other protected sites such as SSSIs, Natura 2000 and Ramsar sites, DNOs and their contractors will be expected to work closely with bodies such as English Nature to ensure that any potential impact on the special features of these sites is fully taken into account in deciding whether work can take place, and if so, in what manner and when. The Wildlife and Countryside Act 1981, as amended, and the Habitats Regulations 1994 set out the regimes protecting these sites and this legislation must be complied with. DNOs should also have in mind their general duty to take reasonable steps to conserve and enhance the special interest features of these sites in the exercise of their functions.

4.3.17 In recent years, 2 EU directives have been issued, which may also impact on the degree of vegetation management to be undertaken:

- The Habitats Directive[18], which aims to contribute to the conservation of biodiversity by creating and restoring certain natural habitats and wild species, and
- The Birds Directive[19], which applies to birds, their eggs, nests and habitats.

4.3.18 It is also important to be aware of the regulatory context in which the electricity industry operates. Ofgem is the regulator for both the electricity and gas markets, and its principal objective is to protect the interests of consumers – both in terms of the charges they pay and the quality of supply they receive. Ofgem also has regard to other statutory duties, including its duty to ensure that licensees can finance their activities and obligations relating to the environment.

[18] Directive 92/43/EEC – The Conservation of Natural Habitats and of Wild Flora and Fauna.
[19] Directive 79/409/EEC – The Conservation of Wild Birds

4.3.19 As part of the regulatory process, Ofgem has recently put in place a number of measures that may have a bearing on the proposals:

- Interruption Incentives Scheme – Since this scheme was introduced in April 2002, Distribution Network Operator (DNO) performance has been assessed against targets set by Ofgem for the number of customers interrupted per 100 customers (CI) and the number of customer minutes lost per customer (CML). In April 2005, a new 5-year distribution price control review (DPCR) period has started, which may reward or penalise DNOs anything up to 3% of revenue depending on performance in these areas. It should also be noted that the impact of severe weather events[20] are excluded from the incentive scheme.

- Severe Weather Compensation Standards – In 2005, Ofgem introduced new severe weather compensation standards[21]. These guarantee compensation payments to consumers where supplies are interrupted due to severe weather conditions and those supplies are not restored within a pre-determined time period. The time period is dependant on the severity of weather concerned.

- Increased allowances for Vegetation Management –The total historic average spend over the period 2000-2003 was £40.1m pa. Over the new DPCR period, Ofgem has allowed the 14 DNOs of Great Britain a total of £53.8m per annum to spend in this area[22]. Consequently, the total spend for the last complete reporting year (2004/5) was circa £52m.

- New allowances for undergrounding in AONBs – In response to some evidence that customers value visual amenity and are willing to pay for improvements through their electricity bills, Ofgem is allowing the NOs a total of £64m over the DPCR period to place circa 640km of overhead lines in national parks and AONBs underground. As it is estimated that there are over 42,000km of overhead lines in such areas, this equates to circa 1.5% of the total overhead network.

4.3.20 Furthermore, a number of major supply interruptions gained widespread media coverage throughout 2002 and 2003:

A The UK storms in October 2002

Storms, with winds reaching speeds approaching 100mph, hit much of England and Wales during 27 October 2002, causing widespread damage to the electricity network. It was estimated that approximately 2 million domestic customers consequently lost supplies. Most customers had their supply restored within 18 hours but for some consumers restoration was not finally completed some 10 days later on 5 November 2002.

[20] Severe weather events are defined as weather events which cause 8 or more times the daily mean number of faults at higher voltage in a 24-hour period – Source Ofgem – Electricity Distribution Price Control Review, Final Proposals, Nov 2004

[21] The Electricity (Standards of Performance) Regulations 2005 – Regulations 6 and 7

[22] Electricity Distribution Price Control Review – Final Proposals – Nov 2004 – 265/04 http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/9416_26504.pdf?wtfrom=/ofgem/work/index.jsp&section=/areasofwork/distpricecontrol

The then Energy Minister commissioned British Power International to investigate electricity company performance. The report[23] found that 'an analysis of faults and their causes indicates that the overwhelming majority were related to trees or branches falling on or into overhead lines, or wind blown debris. Few faults were reported as being related to a failure of the network infrastructure itself (e.g. broken poles, stays, conductors).'

Major storms affecting the electricity infrastructure in the UK have been infrequent but they are not unusual. Other notable examples include the 1998 Boxing Day storm, the Burns Day storm of 25 January 1990, the Great Hurricane of 16 October 1987 and two major blizzards in the winter of 1981/82.

Indeed, problems around the management and control of tree growth is nothing new to the UK Electricity Industry. Following the storms of December 1981 and January 1982, the subsequent Baldock[24] report found that 'fallen trees, broken branches and windbourne materials were generally the cause of many line failures, particularly on the LV system'. One of the recommendations arising out of that report was that 'the standard of tree growth control should be improved for all classes of lines and especially in relation to LV lines'.

B The US/Canada blackout in August 2003

On 14 August 2003, large parts of the East Coast of USA and Canada experienced a blackout, affecting some 50 million people and electrical demand of 61.8GW (similar to peak GB electricity demand). The economic impact was also very significant. The US President and Canadian Prime Minister established a joint task force to investigate the incident, led by the Secretary of the US Dept of Energy and the Canadian Minister of Natural Resources. They conducted a thorough investigation and published their final report[25] on 5 April 2004.

In summary, the task force identified the sequence of events as follows: -

- Loss of key transmission circuits due to tree faults that were not communicated sufficiently clearly, either in the area they occurred or to other surrounding utilities.
- As a result of these key circuits tripping, other transmission routes became overloaded and successively tripped off in a "cascade".
- The "cascade" was stopped only by the operation of protection relays on the transmission system in adjacent areas to the "cascaded" area, reacting to power fluctuations tripping circuits in time to limit the area of impact.

The task force concluded that the events that occurred in the US evolved from a sequence of unrelated local events that cascaded at an accelerating rate into a

[23] Source – DTI/BPI Report 'October 2002 Power System Emergency Post Event Investigation – Overview Report' - dated December 2002.
[24] Department of Energy – 'Review of Technical Standards for Overhead Lines following Storm Damage in December 1981 and January 1982' – dated September 1982.
[25] Available on Natural Resources Canada website at:
http://www.nrcan-rncan.gc.ca/media/docs/final/finalrep_e.htm

full collapse over a wide area. The task force identified four groups of causes of the blackout:

- Inadequate system understanding,
- Inadaquate real time information (situational awareness),
- Inadequate tree trimming; and
- Inadequate reliability co-ordinator diagnostic support.

The task force stated in its final report that 'ineffective vegetation management was a major cause of the 14 August 2003 blackout' and recommended that enforceable standards be established for maintenance of electrical clearances in right-of-way areas. The North American Electric Reliability Council (NERC) is currently working with the US Federal Energy Regulatory Commission (FERC) and government agencies in Canada with an aim of developing such standards. As part of the investigation, FERC also commissioned utility vegetation management specialists, CN Utility Consulting[26], to analyse the transmission line outages related to the incident, the vegetation management practices of 3 utility companies, and identify best prectices in vegetation management.

C The Italian blackout in September 2003

Shortly before 3.30am on 28 September 2003, Italy was hit by its most serious power cut in decades. Over 50 million consumers lost supplies.

The Union for the Co-ordination of Electricity Transmission (UCTE)[27] subsequently launched an investigation and published the final version of the report[28] in April 2004.

The chain of incidents, which resulted in the power cut, began when a tree touched a 380,000-volt transmission line in Switzerland. This led to an extra draw and overloads on the French, Austrian and Slovenian lines through which Italy also imports energy. When two French transmission lines failed, all connections to Italy dropped out, resulting in a 6,000 MW shortage in imported supply. This degree of supply interruption, equal to roughly 25% of Italian demand at that time, could not be absorbed by the Italian grid, particularly as low prices for night time electricity gave domestic producers little incentive to run turbines.

4.3.21 The International Energy Agency (IEA) also investigated the circumstances surrounding the US and Italian experiences and found that effective vegetation management is critically important for maintaining transmission system security. The IEA made recommendations regarding the need for improving vegetation management processes in its report[29].

[26] Report available on FERC website at: http://www.ferc.gov/cust-protect/moi/uvm-final-report.pdf
[27] The "Union for the Co-ordination of Transmission of Electricity" (UCTE) coordinates the operation and development of the electricity transmission grid from Portugal to Poland and from Belgium to Romania and Greece.
[28] Available at: http://www.ucte.org/pdf/News/20040427_UCTE_IC_Final_report.pdf
[29] IEA report: Learning from the Blackouts – Transmission System Security in Competitive Electricity Markets, Oct 2005 – ref IEA/GB(2005)45

4.3.22 Although, in total, several different factors contributed to these incidents, it is clear that the common theme running through all the incidents is that effective vegetation management could have either prevented or reduced the impact of these incidents.

4.3.23 Given all the experiences in the UK with the issue of vegetation management and its impact on electricity network performance, and the lessons learnt in light of the incidents abroad, it is apparent that tree management is a significant issue that needs to be addressed in order to ensure the resilience of electricity networks in Great Britain.

4.3.24 It is also clear that any proposals that arise to address this issue need to be balanced and proportionate to ensure environmental, social and regulatory impacts are not overlooked.

4.4 Renewable Energy Zones (REZ)

It is believed that the risks posed by the creation of REZs, in relation to offshore generating installations, are already addressed by the Regulatory Impact Assessment for the Energy Act 2004. It is anticipated that the subsequent extension of the ESQCR will pose no significant additional risks to generators as the same levels of compliance would be required whether the generating station was to be located either on-shore or off-shore.

Not all the Regulations in the ESQCR are directly applicable to offshore generating installations, as they relate, in the main, only to distributor or consumer installations. Consequently, the specific Regulations which do not have relevance offshore are explicitly mentioned in the draft Statutory Instrument. The only requirements that should apply are those that are relevant to installations that export electricity to the distribution or transmission infrastructure.

5. CONSULTATION

5.1 A formal public consultation on these proposals was launched on 7 June 2005 and it ran until 2 September 2005. All associated documentation with this process can be found on the DTI website[30]. Approximately 140 parties were invited to respond to the consultation.

5.2 A consultation workshop was also held for the electricity sector on 16 August 2005 to discuss issues arising from the proposals. During the consultation period, DTI Officials also met with other interested parties on an individual basis.

5.3 Parties invited to respond to the consultation from within Government included DCLG (Department for Communities and Local Government), DEFRA (Department for the Environment, Food and Rural Affairs), Scottish Executive, Forestry Commission, and English Nature. Other Government bodies such as Ofgem

[30] Available at: http://www.dti.gov.uk/consultations/page15238.html

(Office of Gas & Electricity Markets), DfT (Department for Transport), Scotland Office, Scottish Natural Heritage, Countryside Council for Wales, NafW (National Assembly for Wales) and Maritime and Coastguard Agency were also invited to respond.

5.4 In addition to the above government departments, agencies and regulators, several other sectors were also invited to comment. These included:

- Companies from the electricity distribution and transmission sectors,
- Trade Associations
- Arboriculture and Forestry Groups
- Landowners, and
- Consumer Groups.

5.5 A total of 32 responses were received as part of the consultation process from a wide cross-section of sectors. There was broad support for the proposals relating to updating references to BS7671 and exempting tramway and trolley vehicle systems from the Regulations. However, there was a mixed response towards the proposals for vegetation management and offshore installations. Although 10 respondents (31%) expressed dissatisfaction with the vegetation management proposals to varying degrees, 19 respondents (59%) were either fully supportive or offered qualified support. Only 4 respondents (13%) raised concerns with the offshore proposals.

5.6 A more detailed analysis of the responses received can be found in the 'Summary of Responses Document', which was published on DTI's website on 30 November 2005[31]. A full list of consultation respondents is shown in Annex 2.

5.7 In light of the responses received during the public consultation, the vegetation management and offshore proposals were further refined and several key stakeholders were consulted informally over the period to May 2006. Several respondents who were previously opposed to the proposals had changed their position. The result was a much broader level of support across all sectors, which include industry, government and arboriculture/forestry.

6. OPTIONS

6.1 **BS7671 Amendment No2**

The two main options for this proposal are either to reflect the latest amendment in the ESQCR or 'do nothing'. The latter option is rejected on the basis that there are no significant risks associated with reflecting the latest amendment of BS7671. The harmonisation of cable core colours is an EU requirement and the IET/BSI Impact Assessment[32] shows that the UK is working from a very safe base and that the risks associated with harmonisation are low.

6.2 **Tramways, Trolley Vehicle Systems, and other modes of Guided Transport**

Again, the two main options for this proposal are either to amend the definitions of 'consumer' and 'distributor' in Regulation 1(5) of the ESQCR or 'do nothing'. The rationale for government intervention discussed in section 4.2 shows that

[31] http://www.dti.gov.uk/files/file29465.pdf
[32] Available at: http://www.iee.org/Publish/WireRegs/Impact_2004.pdf

there are no significant risks posed by the proposed change as these modes of transport are subject to other existing legislation enforced by bodies such as HM Railways Inspectorate. The 'do nothing' option is rejected on this basis.

6.3 **Vegetation Management**

The risks relating to vegetation management in proximity to overhead line distribution networks are considered to be significant and are studied in further detail. Four options have been identified:

- Option 1 – do nothing and continue to rely on existing arrangements
- Option 2 – apply voluntary code of practice across entire industry, or rely on self-regulation through professional associations
- Option 3 – amend regulations
- Option 4 – amend regulations supported by an agreed code of practice.

6.3.1 **Option 1 – Do nothing**

The existing regulations could remain in force, administered by the Engineering Inspectorate. The emphasis on keeping trees clear from overhead lines for reasons of safety would remain. However, there would be no additional emphasis on keeping trees clear for reasons of supply reliability, other than a reliance on the general requirement to prevent supply interruption 'so far as is reasonably practicable' in the ESQCR (Regulation 3(1)(b)).

6.3.2 **Option 2 – Voluntary Code of Practice or Self Regulation**

To date, the licensed electricity companies have implemented ENATS 43-8[33] issued by the Energy Networks Association as a means of facilitating compliance with the provisions of the existing regulations. In future, the Energy Networks Association, or some other alternative professional body, could seek to widen the scope of this code of practice to include maintaining trees clear of overhead lines for reasons of supply reliability or introduce a new code of practice. Participants would then agree to implement the new standard on a voluntary basis.

6.3.3 **Option 3 – Amend existing Regulations**

Amend the existing Regulations and establish a clear emphasis on maintaining trees clear of overhead lines on grounds of supply reliability 'so far as is reasonably practicable'. Full participation will be assured. It is also proposed that the coming into force of this Regulation is deferred until 31 January 2009 to allow participants sufficient time to demonstrate compliance.

6.3.4 **Option 4 - Amend existing Regulations supported by an agreed code of practice**

This is effectively a combination of options 2 and 3 above. Full participation is assured, in addition to ensuring a consistent approach when adopting the necessary standards to realise the benefits sought. As with option 3 above, the proposed date for the coming into force of this Regulation is deferred until 31 January 2009.

[33] Energy Networks Association Technical Standard 'ENATS 43-8 Overhead Line Clearances – Issue 3' dated 2004

6.4 Renewable Energy Zones (REZ)

The two main options for this proposal are either to formally extend the scope of the ESQCR to apply to offshore generating installations or 'do nothing'. If the offshore generating station is situated within the Territorial Sea of the UK, it is arguable that the existing ESQCR will already apply. However, the creation of REZs in the Energy Act 2004 allows for offshore generating plant to be installed beyond the Territorial Sea waters of the UK. The existing ESQCR do not cater for this aspect, and it is for these reasons that the 'do nothing' option is rejected.

7. COSTS AND BENEFITS

7.1 BS7671 Amendment No2

The impact assessment[34], drawn up by a joint committee of the IET and BSI, reveals that there are negligible costs associated with the colour changes in cables and flexible cords. The only colour changes are expected to be where new wiring is required at existing installations and some marking is required at the interface. It is anticipated that the changes will have no effect on the cost of cables.

7.2 Tramways, Trolley Vehicle Systems, and other modes of Guided Transport

The ESQCR were never originally intended to apply to tramway, trolleybus and other guided transport systems. As the proposed changes will simply formalise existing enforcement practice, the proposed changes to the definitions of 'consumer' and 'distributor' in the ESQCR are expected to have no cost effects.

7.3 Renewable Energy Zones (REZ)

The costs of complying with the ESQCR will apply to offshore generators including those operating in the REZ. Whilst operating in the marine environment is different in certain respects from conditions onshore, it is not expected that compliance costs will be materially different as a result of the change in legislation. Offshore generators currently in commission within the Territorial Sea are expected to comply with the requirements of the ESQCR.

7.4 Vegetation management

The anticipated costs and benefits associated with the proposed objective relating to vegetation management are considered to be significant and are analysed in further detail below.

7.4.1 BUSINESS SECTORS AFFECTED

The businesses most affected by this particular proposal will be those that are engaged in the distribution and transmission of electricity in mainland Great Britain. The companies concerned are Scottish and Southern Energy, ScottishPower, Central Networks, CE Electric, United Utilities, EdF Energy, Western Power Distribution, and National Grid. Each of these companies has at least 2,000 employees.

[34] Available at http://www.iee.org/Publish/WireRegs/Impact_2004.pdf

There are also several other organisations (circa 200) that fall under the scope of 'distributor' in the ESQC Regulations. These are organisations that own and operate smaller networks in order to both supply themselves and other consumers connected to their networks. Such organisations include Port Authorities, the Ministry of Defence, and other Local Authorities. The vast majority of these organisations will own little or no overhead line networks. Only those distributors with extensive overhead line networks will feel direct impact.

Most distribution and transmission companies employ arboriculturists to carry out the vegetation management workload in proximity to their overhead line networks. Hence, it is expected that those arboricultural companies that do undertake work for the utilities may also be affected. In this particular sector there are a few large companies such as Fountains plc and Tillhill Forestry Ltd with several hundred staff and circa 200 much smaller companies with only a handful of staff.

Indirectly, these proposals may impact on the commercial interests of landowners and land managers where an increase in vegetation management may affect the purpose for which the land is used. For example, timber growing and shooting businesses.

There may also be indirect impacts on other areas in the public sector where other statutory restrictions apply. There may be increased notifications to English Nature and Scottish Natural Heritage in respect of works in SSSIs. There may be more applications to the Forestry Commission and Local Authorities in respect of felling licences and TPOs.

7.4.2 BENEFITS

The measures are primarily aimed at improving supply reliability (both at times of extreme weather conditions and during day-to-day normal operations). The anticipated benefits can be assessed in terms of the reduction in supply failures due to contact with trees and other airbourne materials.

When considering the likely benefits of this proposal, current guidance on Regulatory Impact Assessments require that environmental and social impacts be also explicitly considered in addition to economic impacts. Within these complex issues there are many overlapping areas. For the purposes of clarity, a table summarising the economic, environmental and social impacts is included with each of the options being considered. Further discussion is included beneath each table.

7.4.2.1 **Option 1 – Do nothing**

Table 4 –
Summary of Economic, Social and Environmental Benefits of Option 1

	BENEFITS
ECONOMIC	**None** - Recent overall trend of tree related faults is upwards - Current regulatory performance measures require further development to address network resilience
SOCIAL	**None** - Probable reduction in electricity supply reliability - Amenity value of trees will probably increase in the absence of better vegetation control
ENVIRONMENTAL	**Partial** - Tree growing season increased - Stronger and more frequent winds may be evident in the future - Tree cover maintained and habitats protected - Possible increase in biodiversity.

This Option would not bring about the additional benefits sought. There is concern that the current regulatory and legislative frameworks need further development in order to adequately address the issue of network resilience to adverse weather events. Over the last 15 years, the overall trend of tree related faults on the UK's electricity networks is significantly upwards (graph 1 on page 12 refers), which would suggest that the industry is not maintaining vegetation clear of overhead lines in accordance with the national standard (ENATS 43-8) particularly well. The storms of October 2002 resulted in circa 2 million domestic customers losing supplies.

The Met Office study[35] showed amongst other things that the growing season has increased and stronger and more frequent winds may become evident in southern Britain. In addition, NOs feel that the amenity value of trees has increased significantly in the eyes of landowners, restricting electricity company vegetation management schedules. Statutory powers enabling companies to fell or lop trees are very seldom used. This would suggest that if the regulatory regime stands still, overall network performance might deteriorate further in this respect.

Ofgem's work in this area is an important lever for realising the benefits sought. However, it is unclear whether, at present, the performance measures used are appropriately precise in addressing the specific issue of supply reliability and vegetation management, particularly in adverse weather conditions.

Since the introduction of Ofgem's incentives scheme in April 2002, the underlying average number of customer interruptions per 100 customers (CIs) has fallen by 16%

[35] Met Office Report prepared for the Network Resilience Working Group: 'Extreme Weather Events likely to Cause Disruption to Electricity Distribution' – dated August 2003

and the number of customer minutes lost (CMLs) has reduced by 16%. An analysis of Ofgem's Quality of Service Report[36] also reveals that there has been some improvement in underlying performance for both the number and duration of interruptions over the period 2001 to 2005 (i.e. when major storms are excluded). However, the report also shows that major storms (such as in October 2002 and January 2005) do have a significant impact on the duration of interruptions. Once storms are included in the analysis, the effect is such that there is no discernable improvement in this respect.

In addition, not all DNOs have met their CML/CI performance targets in recent years. In 2002/3, 2 DNOs were penalised a combined sum of £570k for failing to meet CML/CI targets. Similarly, in 2003/4, 3 DNOs were penalised a total sum of £880k, and in 2004/5, 2 DNOs were penalised a combined sum of £570k. It is debatable whether the sums penalised are an effective incentive.

The report also shows that in 2004/5, on a Great Britain basis, the proportion of CIs relating to high voltage (HV) is 73% compared with only 11% at low voltage (LV). Similarly, the proportion of CMLs at HV is 69% and at LV is 18%. When one considers that the split of tree related faults on the LV network to the HV network is roughly 70:30 (see tables 2 and 3 in section 4.3), and that the CML and CI measures include both underground and overhead networks, then it becomes apparent that these measures might not be the most appropriate to bring about improvements in LV performance.

However, it is recognised that comparisons against the Price Control targets are only one way of assessing performance. Ofgem have introduced new compensation standards for consumers who suffer prolonged supply interruptions in severe weather conditions. The main focus of these is to incentivise DNOs to ensure swift restoration of supplies rather than prevention of faults in the first place.

Ofgem have also undertaken further work on developing more appropriate performance measures in time for the next Price Control Period commencing in 2010. However, it is understood that work in this area has proved problematic.

It is felt that full benefits could only be achieved if any new measures being developed by Ofgem are implemented in tandem with either a clearly drawn up voluntary code of practice (Option 2 – but with full DNO participation) or a legislative change (Option 3) or both (Option 4).

[36] Ofgem – Doc ref 258/05 - 2004/5 Electricity Distribution Quality of Service Report – Nov 2005
http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/13039_258_05.pdf?wtfrom=/ofgem/work/index.jsp&section=/areasofwork/qualityservice/qualityofsupply

7.4.2.2 **Option 2 – Voluntary Code of Practice or Self Regulation**

Table 5 –
Summary of Economic, Social and Environmental Benefits of Option 2

	BENEFITS
ECONOMIC	**Partial** - Some improvement in network performance - Some increased employment opportunities in forestry and arboricultural sectors as vegetation control workload is increased - But full electricity industry participation not assured and enforcement unavailable - Reluctance in the past within electricity industry to make effort complying with a voluntary code
SOCIAL	**Partial** - Some improvement in supply reliability in storms - But potential for damaging relations with landowners - Also potential for poor relations with local authorities and the general public who value trees
ENVIRONMENTAL	**Partial** - Potential adverse impact on trees, wildlife, birds, flora and fauna - Any code or standard will need to harness industry-wide best practice to ensure a balanced approach to vegetation management and minimise operational difficulties for all concerned.

This would be of limited benefit since not all duty holders may comply voluntarily with the new requirements due to pressures relating to competing business priorities. The professional body, which would be created to administer codes of practice for the whole industry, would be faced with the problem of resolving many conflicts between different sectors. Presently, all electricity companies have very different approaches to the issue of tree management for a variety of reasons. These include resource issues, management systems in place, and the variation in tree density in close proximity to their networks across the country.

In response to DTI's work in this area, the ENA has recently consulted on and published Engineering Technical Report 132[37], which outlines a risk-based methodology to determine where and when to carry out vegetation management for the purposes of improving network resilience. The document advocates a risk-based approach where 'high risk' trees may be a priority for removal, compared with other 'low risk' trees that are not seen as likely to compromise network resilience. The process described in ETR132 is to be regarded as non-prescriptive guidance on one possible approach to improving network resilience. Therefore, the approach should be seen as one solution within the overall toolbox of solutions available. The report also

[37] Engineering Technical Report (ETR)132 – Improving Network Performance under Abnormal Weather Conditions by use of a Risk Based Approach to Vegetation Management near Electric Overhead Lines – dated March 2006

takes as its starting point the safety clearances for overhead lines as specified in ENATS 43-8[38] and as required under the ESQCR. The expectation is that the current requirements imposed by ENATS 43-8 are to be reinforced 'across the board' with ETR132 to be used as a precision tool to enable NOs to target those critical circuits that would benefit from more proactive vegetation control.

The problem of resolving the many conflicts between the different interests will necessitate careful management. The reason for this is that although an increase in vegetation control will result in an improved electricity supply for consumers in storms, poorly managed vegetation control can result in damaging relations with landowners, local authorities and the general public. Poorly managed vegetation control programmes can also result in adverse impacts on trees, wildlife, birds, flora and fauna. As issues such as care for the environment, standards of workmanship and dealing with arisings are all considered to be out of ETR132's scope, there will still be some significant social and environmental risks in this regard.

Another key factor, which will determine whether ETR132 will be successful, will be the level of available revenue/regulatory requirement to improve performance, as this will determine exactly how much work can be undertaken by NOs. Hence, quantifying the benefits would be especially difficult as much would depend upon how much each electricity company would be prepared to spend, and whether or not the company would choose to comply with appropriate standards, either in part or in whole.

It should also be borne in mind that ETR132 is strictly aimed at improving network resilience in the event of major storms and not at normal day-to-day operations in managing vegetation near overhead lines. Although, compliance with ETR132 may realise some limited benefits in this area.

It is believed that this option would only deliver marginal improvements in supply continuity due to the reluctance of some electricity companies spending time, money and effort complying with a voluntary code. It is felt that full participation will only be assured and adequate resources made available, if the requirement has a statutory basis. Indeed, the main lesson learned since the publication of the Baldock report[39] in the early 1980s is that companies do not necessarily respond to non-statutory recommendations.

There is also the issue of enforcement, should there be specific evidence to suggest instances of non-compliance in the future. This would be unavailable.

There may also be some benefit to local forestry and arboricultural companies who may be employed as contractors or sub-contractors to DNOs, as the vegetation control workload is increased.

To the extent that companies may not wish to fully comply with the voluntary code and existing tree cover is maintained, there may also be benefits for local amenity and wildlife.

[38] ENA Technical Specification 43-8: Overhead Line Clearances – Issue 3, 2004
[39] Department of Energy – 'Review of Technical Standards for Overhead Lines following Storm Damage in December 1981 and January 1982' – dated September 1982

7.4.2.3 **Option 3 – Amend existing Regulations**

Table 6 –
Summary of Economic, Social and Environmental Benefits of Option 3

	BENEFITS
ECONOMIC	**Full** - Improved network performance in storms - Improved network reliability due to fewer tree related faults generally - Full participation assured and enforcement available - Increased employment opportunities in forestry and arboricultural sectors as vegetation control workload is increased - Increased opportunities for rewards for DNOs under Ofgem Interruption Incentive Scheme
SOCIAL	**Partial** - Fewer tree related faults and improved network resilience resulting in improved supply reliability - Risk of damaging relations with landowners, general public and local authorities still present
ENVIRONMENTAL	**None** - With no requirement to adopt good environmental practice, there is a risk that NOs would implement clearance programmes with significant adverse effects on local amenity and wildlife.

The amended Regulations would introduce a 'so far as is reasonably practicable' requirement where overhead lines should not be permitted to come close to trees or other vegetation if they may give rise to unacceptable risk of supply failure. These amendments would be (as the current Regulations are) legally enforceable, which is particularly important for supply reliability in view of the competitive pressures and the participation of new entrants. The creation of a statutory requirement will also ensure that focus is not lost into the future. The Engineering Inspectorate is empowered to enforce the requirements as necessary.

Amended legislation will bring about improvements in the reliability of electricity networks as the companies develop tailor-made programmes that focus on specific opportunities for improving network performance. These programmes could include:

- Reducing the period between scheduled cuts for high voltage lines such that the network is cleared with increased frequency.
- Introducing similar programmes for low voltage networks where previously these were reactive and driven by customer requests.
- Introducing one-off or regular long-term tree clearance programmes where trees that are assessed to be at risk of falling onto strategic high voltage overhead lines are felled.

- Introducing an 'integrated vegetation management' approach where the careful and selective use of herbicide is used to prevent the regrowth of taller fast growing species close to overhead power lines.
- Obtaining agreements with landowners to ensure that no trees are planted in future that may give rise to supply interruption.
- Ensuring that any new overhead line circuits are constructed a suitable distance from existing trees, or that nearby trees are felled before construction.
- Improving internal management systems such as contractor performance management.
- Improving a company's knowledge of the extent of potential interference of the network from trees, where this could inform a risk management process to better prioritise vegetation control.
- Selective or strategic use of alternative options including use of covered or insulated conductors, diverting existing overhead line routes, or undergrounding.
- Improving good working relationships with all key stakeholders (e.g. landowners, public, local authorities etc) to ensure effective vegetation control.

It is acknowledged that NOs have already taken forward some of the suggested initiatives listed above. Indeed, the Industry responded to the storm of October 2002 by taking forward many other initiatives to improve storm performance. However, these primarily focused on improving the management of the fault restoration process and did not necessarily focus on preventing the occurrence of faults in the first place.

During the public consultation process, the widely held view from the Electricity Industry was that a reduction in 'day to day' tree related faults (i.e. not under storm conditions) of the order of 10% was possible. In terms of the figures provided for both the low voltage and high voltage networks shown in section 4.3, this would equate to a total reduction of circa 900 faults per annum at these voltages. It is the DTI's view that this saving would arise primarily from greater levels of compliance with ENA TS 43-8 that would arise from this proposal. The data shown in tables 2 and 3 (earlier in section 4.3) would indicate that this should not be difficult to achieve.

The widely held view from the Industry was that such measures could also yield between 50-60% reductions in tree related faults in abnormal weather conditions where higher standards in vegetation control have been carried out. Clearly, the actual reduction in numbers of faults is difficult to estimate, because much would depend on the size, strength, duration and frequency of any storms. To place this into context, data provided to DTI in response to a storm that affected 7 DNOs to varying degrees on 7/8 July 2004 was analysed. Circa 460,000 consumers were affected by this storm in which recorded wind speeds reached 69mph.The analysis revealed that 252 tree related faults occurred out of a total of 486 faults at 11kV. There were 957 more faults at low voltage, but no data was given as to the specific causes of these faults. Assuming that circa 50% of the low voltage faults were tree related (as was the case at high voltage), a 55% overall reduction in tree related faults could have yielded a reduction of circa 400 faults in this particular storm.

It is also expected that, once the necessary tree clearance programmes have been undertaken, both the numbers of customers experiencing supply interruptions and the

length of time the interruptions last due to severe meteorological events should also be similarly reduced.

The estimated decrease in the number of tree faults will realise modest cost savings in terms of the time spent and materials used to effect the necessary repairs, which would otherwise have been incurred had the measures not already been taken. In terms of cost per fault, all NOs submitted widely varying values as part of the consultation, and some argued that these savings would only be marginal due to the lower than expected likely reduction in tree related faults. The range varied between £350 and £3000 per fault. If it is assumed that the cost of repair is on average £1200 per fault, a reduction of 900 faults per year will realise a cost saving of £1.08m per year.

In order to give an estimate of the likely costs savings in storms, taking the same fault repair cost into consideration for the storm of July 2004 mentioned above would also realise a saving of £0.48m.

This option will also realise further indirect economic benefits for electricity companies. These include possible rewards under Ofgem's new Interruption Incentive Scheme[40] and a reduction in the risk to electricity company share price falling from perceived poor performance. The increase in electricity reliability will also result in a small increase in revenue from use of system charges applied to those organisations in the retail side of the electricity market.

As in the voluntary code of practice option (Option 2), there will still be social risks by way of potential for damaging relations with landowners, the general public and local authorities, should vegetation control works be poorly managed. Similarly, there will also still be environmental risks associated with potential adverse impacts on trees and associated wildlife. Each electricity company will have to ensure that good arboricultural practice is followed and that excellent communications with landowners and other interested parties are developed to minimise these risks.

A consistency of approach may also be lacking as each company may adopt differing methods for achieving these aims. This may pose additional problems that will also need to be managed. One possible option is for the Engineering Inspectorate to specify in great detail exactly what measures are needed and how they are to be implemented. However, this is not preferred due to the even greater risk of designing proposals that then adversely distort the regulatory mechanism and result in non-optimal investment for the level of benefit actually achieved.

[40] Ofgem's new Interruption Incentive Scheme will have symmetric annual rewards and penalties depending on each DNO's performance against their targets for CI and CML. The proportion of revenue exposed under the scheme is 3% of revenue.

7.4.2.4 **Option 4 – Amend existing Regulations supported by a code of practice**

Table 7 –
Summary of Economic, Social and Environmental Benefits of Option 4

	BENEFITS
ECONOMIC	**Full** - Improved network performance in storms - Improved network reliability due to fewer tree related faults generally - Full participation assured and enforcement available - Increased employment opportunities in forestry and arboricultural sectors as vegetation control workload is increased - Increased opportunities for rewards for DNOs under Ofgem Interruption Incentive Scheme
SOCIAL	**Full** - Fewer tree related faults and improved network resilience resulting in improved supply reliability - Minimising risk of damaging relations with landowners, general public and local authorities
ENVIRONMENTAL	**Partial** - Potential adverse impact on trees, wildlife, birds, flora and fauna - Any code or standard will need to harness industry-wide best practice to ensure a balanced approach to vegetation management and minimise operational difficulties for all concerned.

This option combines the best aspects of Options 2 and 3. The benefits highlighted in Option 3 above will still be achievable under this Option. These include full participation being assured and enforcement being available. By adopting a 'lighter' regulatory touch, we also ensure that those who know their networks best (i.e. the NOs) have full flexibility when determining exactly how best to approach the issue of network resilience. This also minimises any risks of adversely distorting the regulatory mechanism resulting in non-optimal investment for the benefits sought.

The ENA's recent work in developing ETR132 has been discussed earlier in section 7.4.2.2 (Option 2). ETR132 could complement the 'so far as is reasonably practicable' requirement of the new Regulation, and under this option would be specifically referred to in the amended guidance document associated with the new Regulations. ETR132 advocates a risk-based approach where 'high risk' trees may be a priority for removal, compared with other 'low risk' trees that are not seen as likely to compromise network resilience. The expectation is that the existing requirements imposed by ENATS 43-8 are to be reinforced across the board, with ETR132 to be used as a precision tool to enable NOs to target those critical circuits that would

deliver the best performance improvements after more proactive vegetation control was undertaken.

It must also be noted that ETR132 does not necessarily address the ever-present environmental and social risks that arise from increased vegetation control activity. In order to address this gap, discussions with the ENA have resulted in an agreement to develop an additional best practice guide to improve communications and relations with the range of stakeholders that are key to securing a balanced approach to vegetation management and minimise operational difficulties for all concerned. The expectation is that what amounts to good practice in key issues such as standards of workmanship, communications with landowners (and other stakeholders), compliance with environmental obligations and the risk assessment process can be harnessed into one document. It is envisaged that work on such a guide is to commence in 2006 with a view to publication some time in 2007/8.

Another benefit includes the opportunity to involve all interested stakeholders in the drawing up of such a best practice code (i.e. not simply the Electricity Industry). By fostering closer working relationships between these groups, a better understanding of each other's needs should minimise any social risks that may arise from increased vegetation control activity.

It is envisaged that the ETR132 standard will be applied on a modest yet progressive basis (circa 0.8% of 11kV and 33kV overhead line networks per annum, leading to 20% of those networks meeting the ETR132 standard after 25 years). This is to ensure that any such works are undertaken as sensitively as possible in order to minimise the environmental and social risks. In the medium to long term, this may also introduce significant savings to NOs, as the proportion of overhead network that is treated to ENATS 43-8 standards falls. Consequently, this may result in a similar reduction in NO spending on compliance with ENATS 43-8.

It is also proposed that the coming into force of the amendment be deferred until 31 January 2009 to allow duty holders and their associated arboricultural contractors sufficient time to be able to demonstrate an acceptable degree of compliance with the new requirement.

It is also important to note that networks operating at other voltages (e.g. low voltage distribution networks and transmission networks) should not be overlooked when implementing a strategy for improved network resilience to storm conditions.

The situation at low voltage is particularly important. It is felt highly unlikely that LV overhead networks are ever to fall under the scope of ETR132. Operating a more stringent vegetation control strategy is likely to encounter fierce resistance from landowners, as the amenity values are highest. However, DNOs could make significant improvements to the resilience of LV networks in storms by replacing bare wire networks with fully insulated cable systems such as ABC (Aerial Bundled Conductor). ABC does give a significant improvement of up to 10 times the reduction in fault rate during storms compared with bare wire. As regulatory funding under the last Price Control allows for a 40-50 year replacement timescale, it is possible that a reduction of circa 45% in day-to-day tree related faults (at LV) could be achieved after 25 years with measures currently in place. Better targeting of resources at more

problematic circuits could realise further improvements. In the event of any future storm, there is also the added benefit that more resources could be deployed more swiftly to repair LV faults, as the effect of storms on the 11kV and 33kV networks falls.

Again, the picture at transmission voltages is also important. The impact of amended Regulations is likely to be more significant for distribution companies, but the effect upon transmission should not be underestimated. ETR132 should provide a suitable framework, which will allow all network operators to make their own decisions based on risk assessments appropriate to their individual businesses and networks. Although tree related faults are rare events on the transmission networks and the clearances prescribed by ENATS43-8 are much greater at these voltage levels, the risks are also that much greater as many more consumers could be impacted by any such events. The experiences in the US and Italy in 2003 should serve to remind all that such scenarios can and do occur.

7.4.3 COSTS

When considering the likely costs of this proposal, current guidance on Regulatory Impact Assessments also require that environmental and social impacts be explicitly considered in addition to economic impacts. As was the case with considering the likely benefits in the preceding section, there are many overlapping areas. In the interests of clarity, this section is further split into:

- Costs for a typical electricity business
- Total costs to the electricity industry
- Costs for other affected sectors

The first two sections involve an analysis of the economic impacts from the electricity industry perspective and the final section will analyse economic, environmental and social impacts from the perspective of other affected sectors.

7.4.3.1 - COSTS FOR A TYPICAL ELECTRICITY BUSINESS

Vegetation Management

There are presently circa 170,000km of High Voltage (HV) and 68,000km of Low Voltage (LV) distribution overhead line network in Great Britain. There are also circa 16,000km of transmission overhead line network. The density of trees in close proximity to overhead lines differs markedly across the country. Therefore, each electricity company has had widely varying approaches to the issue of tree management for reasons of resources, and existing management systems. Compliance with current arrangements under ENATS 43-8 has also been variable. Each individual company will need to further develop its own tailor-made programme to improve its vegetation management processes; firstly, to ensure full compliance with ENATS43-8 and secondly, to improve network resilience by adopting a standard such as ETR132. Should option 4 be chosen, it is anticipated that each NO will carefully select the appropriate measures which will deliver optimal benefit without adversely distorting the present regulatory framework. A risk-based approach targeted on ‘critical’ circuits

is envisaged. Criticality may depend on any number of factors such as historic circuit performance, other company or regulatory performance measures, and high-risk weather areas.

The possible measures highlighted earlier in section 7.4.2.3 would typically cost:

Increase frequency of HV tree cutting
By increasing the frequency from once every 5 years to every 3 years, the annual cost could be expected to increase by 66%, but there may be some savings with economies of scale. However, a significant number of vegetation management visits are restricted by landowners that necessitate more frequent visits (usually on an annual basis – estimated at 10% of the network). The costs associated with these more frequent restricted cuts are unaffected by the reduction in tree cutting cycle provided that the restricted cut frequency is shorter than the new scheduled cutting frequency. It is estimated that a typical company currently spends approximately £2m per annum, and when the economies of scale and restricted cuts issues are factored in, it is estimated that the marginal increase in cost by such a measure is approximately £1.0m per year. It is felt that this measure is more likely to improve existing levels of compliance with ENATS43-8 requirements, but there may be some marginal improvement in network resilience.

Introduce LV tree cutting cycle
It is anticipated that this would not necessarily introduce large costs as those companies that do not have a cyclical regime are still cutting trees on an ad-hoc basis driven by customer requests and regular inspection reports. By introducing a cyclical regime, this would be an extension of current practice at high voltage. Several companies have already indicated their intention to undertake this measure. Based on company submissions to Ofgem, as part of the current Distribution Price Control Review Period, it is estimated that a typical company currently spends approximately £1m per annum and this may increase by circa £300k per year. Again, it is felt that this measure is more likely to improve existing levels of compliance with ENATS43-8 requirements, but there may be some marginal improvement in network resilience.

Landowner agreements
In most cases it is expected that the costs associated with this measure will fall to the electricity companies. It is recognised that companies already pay the majority of landowners an annual fee for allowing them the use of the land to place and maintain their plant and equipment. Companies can work towards ensuring that future Wayleave agreements include a clause warning landowners of the risks associated with planting trees close to lines or they could choose to merely educate them by sending some form of leaflet or booklet. The DTI also intends to publish guidance on its website in order to further clarify the extent of the statutory powers available to NOs and, also, to educate the general public as to the merits of a more resilient network, whilst highlighting the environmental constraints that apply. It is anticipated that there is no significant marginal increase in cost with this measure.

Ensuring new overhead lines are clear of trees
Again, it is anticipated that the costs associated with this measure will fall to the electricity companies as existing company policies and procedures will need to be amended. Whilst some NOs have a policy in place to achieve fall-over clearance where practical for new overhead lines, there is also the recognition that a balance

needs to be struck to determine whether the line should be re-positioned or the vegetation should be trimmed back or removed. However, these costs are not expected to be significant. It is accepted that this measure will have little impact on network resilience in the short term as only circa 0.2% of completely new HV lines are built every year, and a significant proportion of these will be 'spurs' and not 'main lines'. Spurs are unlikely to ever fall under the scope of ETR132.

Improving contractor performance management
The extent to how much this measure will cost depends on the improvements that need to be made. In the majority of cases, it will include the development of accurate and appropriate measures on which to measure performance. Namely, that clear tree cutting and felling standards have been set, that the tree cutting and felling programmes are up to date, and that overhead line inspection schedules are up-to-date and any subsequent remedial actions are undertaken in a timely fashion. This would typically be absorbed within the business. In other cases, this may include redeploying internal resources to increase the effective monitoring aspects of the tree-cutting contract. Again, this would represent a negligible marginal cost.

Improving knowledge of the extent of trees close to networks
Accurate site information is very important. Surveys collecting information on species, density, environment and proximity to the overhead network will help manage the tree cutting process more effectively. This may not be as onerous as first thought, as new technologies are now available on the market, which involve the use of aircraft fitted with lasers in order to survey lines. The costs associated with this measure will also vary considerably according to exactly what information is required and exactly how this information is to be gathered and stored. Some companies have recently undertaken surveys of their overhead lines and used the latest modelling techniques to predict the likely impact of vegetation encroachment on their lines over the next 5 years. This will enable the companies to develop long-term risk assessment programmes that will deliver efficiency improvements. Depending on exactly what the requirements are the typical cost of this measure could vary from £100k to circa £2m per NO. The period over which these costs are accumulated could vary depending on the frequency of survey. It is anticipated that this option is more beneficial in helping NOs prioritise their vegetation control programmes in terms of improving compliance with ENATS 43-8. However, any new information gained here could help inform the selection of areas which are to be treated to ETR132 standards.

Other options – Covered Conductor, Diversionary Works, Undergrounding
There are other options available to DNOs as alternatives to tree cutting or felling. It is recognised that the use of covered or insulated conductors (e.g ABC at LV), and diverting or undergrounding existing overhead lines are not necessarily more cost effective than vegetation management. Regional factors, geographic terrain, weather exposure events and together with network design will dictate whether all or some of these measures are appropriate for each DNO. However, if used strategically or selectively, benefits may be realised in certain circumstances where, for example, the trees are protected by preservation orders. Again, several NOs have already signalled their intention to use these options where appropriate, but it is anticipated that these measures will only be applied rarely. Additionally, Ofgem has allowed each DNO circa £1m per year to place a modest amount of overhead network underground in National Parks and AONBs. It is anticipated that these measures are more likely to

help NOs improve performance in relation to ENATS43-8, rather than be widely used in conjunction with ETR132.

Improving Working Relationships with all Stakeholders
It is recognised that any increase in vegetation control which is poorly managed, may result in adverse reactions from landowners, the public and other relevant bodies. The Electricity Industry already recognises that these relationships are key to successful vegetation control and individual companies have built up a number of good working relationships with certain stakeholders. For example, one NO is a sponsor of the national network of Parish Tree Wardens. Each company must strive to further improve communication channels to deliver a common approach. This may involve lobbying local awareness or environmental groups, educating landowners of the problems that tree growth can cause, encouraging a proactive approach to tree planting close to overhead networks, and sponsoring replacement tree planting programmes elsewhere. The costs associated with these types of measures would not typically be excessive, as they will probably involve redeploying existing staff or financial resources from other PR activities. Hence, this would represent a negligible marginal cost.

One-off or on-going tree clearance programme
Clearly, the costs associated with this measure very much depend on the actual standard set for clearance and within what particular timescale. An evolutionary approach is preferred to a revolutionary approach in terms of implementation of any such programme. A progressive approach will help minimise objections by other stakeholders by taking more time over communicating what works need to be carried out and ensuring that the quality of work carried out does not suffer. ETR132 is a standard that allows sufficient flexibility for the NOs to determine how best to address the network resilience issue. ScottishPower has spent circa £5m in recent times (over a 4 year period) on such programmes. Although modest improvements were achieved in the ‘day to day’ tree related fault rate following the work, 50-60% performance improvements were noted in storm conditions. It is therefore clear that this measure is the single most important measure that will address the issue of network resilience long into the future. In order to best minimise the ever-present environmental and social risks, it is suggested that the implementation of any such programme is gradual and it may take several years before any significant network performance improvements are realised. For a typical DNO, it is anticipated that circa £1.3m per annum should cover the cost of achieving the required vegetation control standard together with associated environmental/ecological surveys, compensation to landowners in respect of land damage, and any extended maintenance that ensues from maintaining a network to a more resilient specification. For a typical TNO, it is anticipated that similar works to improve resilience will cost circa £100k per annum.

Integrated Vegetation Management approach
This technique, which has been successfully used in the USA, involves the careful and selective use of herbicide, which is used to prevent the regrowth of tall fast growing species close to overhead power lines. The aim is to establish a low growing shrub, herb and grass layer in the area underneath overhead lines. Fast growing species are controlled by spot applications of herbicide. After initial clearance work, sites may still need to be visited annually. However, once the low growing shrub layer is established, visits may be reduced to once every 5 years. This method can be

realistically used in conjunction with the tree clearance option above. It is an excellent solution at higher voltages (particularly transmission), but will be very rarely applicable at low voltage. It is known that one TNO has recently been exploring the use of such a technique, and consultation with landowners and relevant statutory bodies has been undertaken. The potential benefits of such an approach include less frequent visits, less disruption to landowners, negligible disruption to wildlife and birds, and the visual impact of maintenance work is minimised. It also has the potential to be used at protected sites such as SSSIs. Quantifying the likely cost of this measure is difficult as it has not yet been tried in the UK, but the US experience would indicate that savings could be made within a few years. On this basis, it is anticipated that there will be no significant marginal increase in cost with this measure.

It is understood that Ofgem, as part of the last Distribution Price Control Review (2005-2010), significantly increased allowances for the DNOs to meet existing clearance requirements as stipulated in ENATS 43-8. There were no allowances granted for an improvement in network resilience standards. Ofgem is also currently involved in the Transmission Price Control Review process with TNOs (for the period 2007 to 2012).

Under the proposals addressed in this Regulatory Impact Assessment, the requirements imposed by ENATS 43-8 have not changed, as they are well understood having been in place since 1989. In addition, most of the possible improvement measures discussed above have already been embraced by all NOs to varying degrees, in order to improve the situation with ENATS 43-8 compliance. For example, most DNOs are in the process of shortening HV cutting cycles and most are exploring means of improving their knowledge of trees and how they are likely to interact with their networks. **Only one of the measures discussed earlier is likely to significantly improve network resilience any further: operating a long-term tree clearance programme (sensitively and to acceptable standards – e.g. ETR132). Some useful benefits could also be realised if an integrated vegetation management approach was also successfully implemented in tandem with such a programme.**

On this basis, it is estimated that the implementation of a tree-clearance programme, along the lines of ETR132, and its associated subsequent maintenance cost would initially cost a typical DNO licence area a further £1.3m per annum. Over time, this cost can be offset by significant savings, which can be made by DNOs after the measures have had sufficient time to take effect. Although the cost for a typical TNO will be circa £100k per annum, it is not expected that significant savings can be made on a similar basis as for distribution companies. The possible savings that can be made are assessed on an industry wide basis in section 7.4.3.2. This compliance cost is estimated to be the same for both Options 3 and 4 and will be needed as a regular on-going long-term investment (i.e. every year).

The costs described above may also be similar in the case of a voluntary code of practice (option 2), but the overall cost to a ‘typical’ company would very much depend on exactly what standards are required to demonstrate compliance and whether it chooses to comply in part or in whole.

7.4.3.2 - TOTAL COSTS TO THE ELECTRICITY INDUSTRY

Distribution Networks

As discussed earlier in paragraph 4.3.19, Ofgem has allowed the 14 DNOs of Great Britain a total of £53.8m per annum to spend on vegetation management over the period 2005 to 2010. Although this is a significant increase on the allowable spend on the previous Distribution Price Control Period (circa £40m pa), this would appear to fall short of what the DNOs originally felt necessary to sufficiently improve network performance. One explanation for this is that no increase in allowance has been given for catch up of any backlog in tree cutting during the last price control period (i.e. during the foot and mouth outbreak in 2001) since Ofgem considers that this cost should be borne by shareholders rather than customers. It must also be noted that the subsequent analysis below gives no account of how much the DNOs saved when not being able to carry out vegetation management duties during the foot and mouth outbreak. It is also understood that no account was made of improving network resilience when determining the new level of investment in vegetation management, and the increase in allowance was solely to enable DNOs to meet existing requirements imposed by ENATS 43-8.

Given the above, and the anticipated compliance cost for a typical DNO to be in the region of £1.3m pa, it can be assumed that the total cost to all distribution companies will be in the region of circa £17m pa[41]. Some DNOs have indicated that the probable compliance cost breaks down to circa £9,000/km. This equates to taking approximately 25 years to enable circa 20% of the entire 11kV and 33kV networks in Great Britain to have nearby vegetation maintained to a resilient standard.

There will also be some modest benefits to DNOs in undertaking such works. For example, DNOs will save on day-to-day running costs, which would otherwise been incurred repairing tree related faults. The analysis in section 7.4.2.3 suggests that the whole Industry could save circa £1.08m pa in this respect, simply from better levels of compliance with ENATS 43-8 that would arise from making a legislative link between that standard and the issue of supply continuity.

Similarly, an analysis of network performance in a storm and the likely benefits that could be realised could save the Industry circa £0.48m in this instance, should a storm of similar magnitude and strength strike again (section 7.4.2.3 refers). Storms, such as the one studied, are infrequent but not unusual. Taking a conservative estimate of such storms having a similar impact on the network only twice a year, it is possible therefore that a further saving to Industry of circa £1m pa can result.

As an increasing proportion of overhead line network is treated to the ETR132 standard, a similar decrease will be experienced in the proportion of network to be treated to the ENATS 43-8 standard. On the basis that circa £17m will be spent for ETR132 purposes at a rate of £9,000 per km, then this will equate to 0.8% of the 11kV and 33kV overhead line networks (circa 1,900km) being treated to a resilient standard every year. For the purposes of this analysis, it is conservatively assumed that for every 0.8% of the overhead network treated to ETR132 standards, there will

[41] EDF Energy (London Power Networks) excluded from this analysis as it has very little overhead line network.

probably be a corresponding 0.6% reduction in the proportion of overhead network to be treated to ENATS 43-8[42]. A 0.6% reduction in the current regulatory allowance for vegetation control (£53.8m pa total) equates to a saving of £0.32m pa. Although this saving is relatively modest in the short term, over the longer term the potential savings can become significant (estimated to be circa £8m by year 25).

Again, it was also mentioned earlier that DNOs could benefit from improved rewards under Ofgem's Incentive Scheme, once the increased vegetation control activity begins to improve DNO CI and CML performance against targets. Two DNO licensed areas estimated a possible benefit of circa £160k each being achievable. On that basis, it is estimated that the whole industry could eventually benefit by circa £2.25m pa.

Transmission Networks

The anticipated compliance cost for a typical TNO is circa £100k per annum. On this basis, it can be assumed that the total compliance cost for the whole transmission sector is likely to be circa £300k per annum. The treatment of transmission networks varies from that of distribution networks in that the clearances specified by ENATS43-8 are significantly greater and, hence, the risks of tree related faults occurring are much smaller. However, this needs to be balanced against the potential impact of tree related faults, which can be much greater.

Given that the issue of vegetation growth in relation to transmission lines is perceived to be less of a concern, it is assumed that the probable compliance cost breaks down to only circa £300/km. On this basis, it is possible that circa 6.3% of the transmission network can be treated to a resilient standard every year. This equates to circa 19% becoming resilient after 3 years.

Overall Electricity Industry Costs

Overall, the compliance cost of the measures required to improve network resilience (options 3 and 4) are likely to cost Industry circa £17.3m pa. However, over time, the Industry will derive modest cost benefits to offset the outlay. It is anticipated that the savings to DNOs could be worth up to £5.5m pa after 10 years and £12.33m after 25 years. This overall cost (£17.3m pa in year 1 reducing to circa £11.5m in year 10 and circa £4.75m in year 25) is considered to be manageable in the context of national electricity distribution charges accounting for circa £3bn annually, and the current allowable regulatory requirement for vegetation management around distribution networks is circa £54m pa. As electricity distribution charges account for around 20% of customers' electricity bills, it is anticipated that the initial cost of this measure will increase bills by 0.1%. The proposed amendment will serve to reinforce the duty imposed on all relevant stakeholders to improve network reliability and resilience in the future.

Table 8 (on page 41) shows a more detailed breakdown of the likely costs and possible savings to the electricity industry over 25 years.

The costs described above may also be similar in the case of a voluntary code of practice (option 2), but the overall cost to all companies would very much depend on

[42] The reason for this is that there may be some cases where return visits are required to comply with ENATS 43-8 even after a part of the network has been initially treated to the ETR132 standard.

exactly what standards are required to demonstrate compliance and whether each company chooses to comply in part or in whole.

7.4.3.3 - COSTS TO OTHER AFFECTED SECTORS

The previous two sections analysed the likely economic costs of the proposals to the electricity industry. The purpose of this section is to analyse the likely cost impacts on other affected sectors outlined earlier in section 7.4.1 (Business Sectors Affected).

It is not anticipated that there will be any significant impacts on other 'distributors', such as Port Authorities and the Ministry of Defence as these types of organisations own very little or no overhead line networks.

It is clear that any increase in vegetation control, as advocated to varying degrees by options 2, 3 and 4, may have impacts on the arboriculturalists who undertake the work on behalf of the electricity companies.

Indirectly, these proposals may also impact on the commercial interests of landowners and land managers if the increase in vegetation control may affect the purpose for which the land is used. There may also be other indirect impacts on other areas in the public sector where other statutory restrictions apply. For example, increased notifications to English Nature and Scottish Natural Heritage in respect of works in SSSIs, and more applications to the Forestry Commission and Local Authorities in respect of felling licences and TPOs.

Table 9 (on page 42) summarises the possible economic, environmental and social costs to these sectors considered here. The summary is by no means exhaustive but it serves to highlight some of the more obvious risks posed by the proposals.

The **aboricultural sector** may well face additional costs in recruiting and training additional staff to undertake the increase in vegetation control. However, it is anticipated that any increase in cost will be more than matched by the increase in electricity company spending in this area.

There is, of course, the risk that if prices go too high, electricity companies may consider taking the work in-house. However, there are also inherent risks to the electricity companies in taking this step, as there is there is little capacity to undertake the additional work at present. Equally, increased competition in this sector may also serve to drive prices down.

The electricity industry is already acutely aware that pressing contractors for the keenest price may result in more contract management being employed to ensure that the quality of work does not suffer. Any reduction in quality will undoubtedly lead to a reduction in network resilience.

Table 8 – Burden of Compliance Costs for Electricity Industry – (Options 3 and 4)

	YEAR																								
Compliance Costs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Distribution Sector	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08	17.08
Transmission Sector	0.3	0.3	0.3																						
Distribution Savings																									
Reduced ENATS 43-8 spend	0.32	0.64	0.96	1.28	1.60	1.92	2.24	2.56	2.88	3.20	3.52	3.84	4.16	4.48	4.80	5.12	5.44	5.76	6.08	6.40	6.72	7.04	7.36	7.68	8.00
'Day to day' fault repair saving	0.11	0.22	0.32	0.43	0.54	0.65	0.76	0.86	0.97	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
Storm fault repair saving	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96	1.00
Regulatory Incentive Scheme Reward	0.09	0.18	0.27	0.36	0.45	0.54	0.63	0.72	0.81	0.90	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62	1.71	1.80	1.89	1.98	2.07	2.16	2.25
Total Savings	0.56	1.12	1.67	2.23	2.79	3.35	3.91	4.46	5.02	5.58	6.03	6.48	6.93	7.38	7.83	8.28	8.73	9.18	9.63	10.08	10.53	10.98	11.43	11.88	12.33
NET COST	16.82	16.26	15.71	14.85	14.29	13.73	13.17	12.62	12.06	11.50	11.05	10.60	10.15	9.70	9.25	8.80	8.35	7.90	7.45	7.00	6.55	6.10	5.65	5.20	4.75

Notes/Assumptions:

- All costs/savings quoted in £m.
- ETR132 distribution compliance cost includes associated environmental surveys, compensation to landowners in respect of land damage, and any extended maintenance that ensues from maintaining the new resilient specification.
- Assumed that 10% reduction in ‘day to day’ tree related faults could be achieved by year 10 (and no further savings thereafter).
- Assumed that the suggested storm tree related fault saving could only be achieved by year 25.
- Assumed that full incentive scheme benefits could only be realised by year 25.
- Assumed benefits from increased use of ABC at LV over 25 year period not included.
- Assumed benefits from reduction of payments under severe weather compensation standards not included.
- Assumed transmission network resilience achieved within 3 years.

It is anticipated that any issues surrounding the disposal of additional waste created by additional vegetation control will not be significant. The waste produced is biodegradable, and can be shredded into small chips or cut down to sensibly sized logs. These can be removed from site or left behind depending on the wishes of the landowner concerned. Additionally, should the waste be deemed to require special treatment, it should then be disposed of in accordance with the required legislation or standards. It is not expected that existing practice will change in this respect.

Table 9 – Summary of possible costs to other affected sectors if vegetation control is increased

	POSSIBLE COSTS
ECONOMIC	- Arboricultural Industry may incur additional costs recruiting and training additional staff to undertake increased workload. - May introduce commercial costs to landowners if vegetation control is likely to affect income and capital value derived from use of land e.g. shooting - May introduce extra costs for timber growing businesses if additional works affect timber crop stability - Additional costs to bodies who administer specific approvals for works in designated nature conservation sites
ENVIRONMENTAL	- Possible additional impacts associated with management of additional waste/debris created - Effects on landscape and amenity - Effects on wildlife e.g. birds
SOCIAL	- Possibility of damaging relations with landowners which could result in increase of Wayleave agreement terminations - Possibility of poor relations with local authorities and the public who value trees

In terms of the **commercial impacts on landowners** of any works affecting the use of their land (e.g. timber growing and shooting businesses), it is anticipated that these risks can be mitigated through developing good working relationships and clear communications between the electricity companies and the landowners concerned. It may be that income is derived from the land on a seasonal basis or a longer-term view can be taken to put in place steps, which will have minimal impact over time. Either way, a good relationship based on mutual trust and a sound understanding of each other's requirements should lead to a sensible negotiated settlement.

Tree works affecting **designated conservation sites** will need specific approval, with associated costs for the administering bodies such as English Nature, Countryside Council for Wales and Scottish Natural Heritage. The electricity companies will have exemptions under tree protection legislation (felling licences and TPOs), so they would not normally need permission. However, the further the tree works are

extended, the more likely they will move beyond the exemption and have to apply, with potential costs for local planning authorities and the Forestry Commission. It is felt that these potential costs can be minimised provided such bodies are closely involved in the development of any national or local standards for increased network resilience.

Adverse impacts to **amenity** and **landscape** can also be mitigated. This again can be achieved through good communications between all interested stakeholders. Replacement tree planting programmes that link up with local and regional tree and woodland forest plans may be one way to mitigate such impacts. Another means could be by sponsoring saplings elsewhere. These measures need not necessarily be expensive. Some bird species are protected during nesting seasons. Vegetation control programmes should be sufficiently flexible to allow for this and other such protected species of **wildlife**.

In terms of the **social** cost impacts, there is the possibility that in some cases landowner relations can be damaged to such an extent that landowners subsequently choose to terminate the Wayleave agreement. Electricity companies then have to choose whether to seek to keep the Wayleave via statutory means or to divert the circuit or remove it altogether. The possible costs of these options are not insignificant. But again, the risks associated with this can be mitigated through developing good working relationships with all interested stakeholders (including local authorities and members of the public). Provided such programmes are well managed and co-ordinated any such possible impacts can be minimised.

It is anticipated that there will be no significant race equality or health impacts arising from the proposals.

Overall, it can be deduced that the potential cost implications highlighted above can be minimised to an acceptable level provided:

- Relationships between all relevant stakeholders are based on mutual trust and understanding,
- Communications between all stakeholders are clear, and
- All tree work is undertaken in accordance with best arboricultural and forestry practice.

On this basis, Option 2 (voluntary code), Option 3 (amend ESQCR) and Option 4 (amend ESQCR supported by national standard) can all serve to minimise the impact of these possible costs. Due to the fact that full participation is not guaranteed with a voluntary code, it is possible that such impacts arising from Option 2 will be somewhat less than Options 3 and 4. However, the downside of Option 2 is that there is no obligation to develop good working relationships with all stakeholders either.

7.4.4 SUMMARY OF COSTS AND BENEFITS

Table 10 overleaf summarises the costs and benefits of each of the four Options considered in relation to vegetation management in sections 7.4.2 and 7.4.3.

Table 10 – Costs/Benefits Summary of Vegetation Management Options

Benefits	**Option 1 – Do nothing**	**Option 2 – Voluntary Code of Practice**	**Option 3 – Amend ESQCR**	**Option 4 – Amend ESQCR with agreed COP**
Economic	**None**	**Partial**	**Full**	**Full**
Network Performance	Will not improve – will probably deteriorate	Marginal improvement expected	Performance improvement optimised – may reduce number of day to day tree related faults by circa 900 pa – could save hundreds more faults in storm conditions	
Arborist/Forestry Employment Opportunities	No further opportunities	Marginal opportunities expected	Growth opportunities maximised	
Industry participation assured?	Not applicable	No	Yes	
Social	**None**	**Partial**	**Partial**	**Full**
Supply reliability in storms	Will not improve – will probably deteriorate	Marginal improvement	Optimal improvement – both the impact of storms on numbers of consumers affected and the time taken to restore supplies should be significantly reduced	
Environmental	**Partial**	**Partial**	**None**	**Partial**
Risks to trees, wildlife, birds, flora and fauna	Will always be a risk if vegetation management programmes are poorly managed – any measures taken will need to encourage best practice and conformance with all relevant guidance and legislation.			
Costs	**Option 1 – Do nothing**	**Option 2 – Voluntary Code of Practice**	**Option 3 – Amend ESQCR**	**Option 4 – Amend ESQCR with agreed COP**
Economic				
Electricity Industry	No extra cost	Difficult to quantify – depends on degree of participation and budget available	Estimate initial cost to Industry of circa £17.3m pa. Savings to DNOs could be worth up to £12.33m pa after 25 yrs. Hence, overall net cost could reduce to circa £4.75m pa in year 25.	
Arborist sector	No extra cost	Some initial cost and subsequent cost savings expected	Some initial costs expected as additional staff are recruited and trained. This will be recouped as vegetation control budgets are increased.	
Commercial impacts on landowners	No extra cost	Difficult to quantify – any adverse effects on the commercial interests of landowners should be mitigated through flexible approach adopted by electricity industry and good working relationships being developed.		
Designated conservation area admin costs	No extra cost	Again, difficult to quantify – any adverse risks can be mitigated provided all the appropriate bodies are closely involved in developing any voluntary or mandatory standards.		
Social				
Risk of damaging relations with landowners, local authorities, public etc	Is an ever present risk – will need careful management from all sides – relationships will need to be based on mutual trust and understanding – communications will need to be clear – all works need to conform to best practice			
Environmental				
Landscape and amenity effects	Again, excellent relationships and communications required between all sides. Proactive measures may be needed including replacement tree planting programmes, lobbying environmental groups and educating stakeholders about the problems tree growth can cause to electricity supply.			

8. SMALL FIRMS' IMPACT TEST

8.1 The likely burden on small business is not considered to be significant since only a relatively small number of businesses participate directly in electricity distribution or transmission. Those that are caught within the scope of the proposed measures are expected to be contracted, or sub-contracted, to the Industry to carry out the required vegetation management workload. There are circa 200 such firms in existence and up to 100 of these engage in utility vegetation control.

8.2 As part of stage one of the small firms impact test, discussions were held with a number of trade associations and small businesses. Evidence from these discussions showed that small firms in this sector are likely to see benefits in terms of increased employment and growth opportunities.

8.3 The Small Business Service have agreed that the proposals are unlikely to disproportionately impact on small firms and there is no requirement to carry out stage two of the small firms impact test. Should any as yet unidentified impacts or unintended consequences be identified, the Small Business Service will be informed and stage two of the test undertaken.

9. COMPETITION ASSESSMENT

9.1 None of the options discussed earlier in section 6 would impact on the extent of competition within the electricity industry. This is because the measures in Options 2, 3 and 4 only relate to the electricity transmission and distribution market segments, which comprise monopolies regulated by Ofgem. The affected parties do not compete with each other for customers.

10. ENFORCEMENT, SANCTIONS & MONITORING

Enforcement and Sanctions

10.1 Option 2 does not necessitate any enforcement action on the part of Government as it relies on either the application of a voluntary code of practice across all distribution and transmission companies, or on self-regulation through a professional association such as the Energy Networks Association.

10.2 In the case of Options 3 and 4, the Engineering Inspectorate will enforce compliance with the amended Regulations. Non-compliance will be identified by analysing responses to surveys being issued to DNOs affected by future storms, by responding to queries raised by consumers and by investigating accidents and incidents. Where necessary, recommendations will be made to duty holders or in the case of serious risks to the public or security of supply, an enforcement notice on behalf of the Secretary of State may be issued. An appeals process is included within the current Regulations to ensure any disputes between the duty holders and the Engineering Inspectorate will be brought to a speedy conclusion. DTI lawyers may also take forward legal proceedings against duty holders in appropriate circumstances.

10.3 It is recognised that it may take some time for duty holders to put in place arrangements for more proactive vegetation control. It is for this reason that the coming into force of the proposed amendment to Regulation 18(5) is to become enforceable from 31 January 2009.

Monitoring

10.4 In the case of Option 2, the impact of a voluntary code of practice or self-regulation process would be assessed over time. The Energy Networks Association, or some other appropriate body, could assess fault data either from the existing NAFIRS system or by some other new system. If NAFIRS data is to be used, efforts must be made to ensure that those companies currently not participating in the process do still provide similar data in the future. The DTI could also analyse responses to surveys being issued to DNOs following storm events.

10.5 In the case of Options 3 and 4, the impact of the amended Regulations over time will be assessed by analysing responses to surveys being issued to DNOs following storm events, and by monitoring reports of faults caused by trees submitted to the Engineering Inspectorate by duty holders. Non-compliance will also be identified by responding to queries raised by consumers and by investigating accidents and incidents. More detailed NAFIRS type data could also be provided to the Engineering Inspectorate either via the Energy Networks Association or from each individual company direct on a regular basis.

10.6 Clearly, the ever-present environmental risks will also need to be closely monitored to ensure that trees and other vegetation are not unnecessarily destroyed. Should option 4 be chosen, it is proposed that independent arboricultural practitioners are brought in to assess the environmental impacts on behalf of DTI. This expertise can be brought in either on a proactive or reactive basis. Thorough environmental assessments on all NOs can be carried out every 4 years, with less detailed audits undertaken at 2-yearly intervals in between. The likely cost of this measure to DTI can range from £5k to £20k per audit depending on the exact scope of the audit to be undertaken. Such expertise could also be used to assess impacts following a major storm on a reactive basis. The cost of this measure is likely to be in the region of £50k (depending on scope and scale etc.).

10.7 It is also worth noting that in Budget 2004, the Chancellor asked Philip Hampton to lead a review into regulatory inspection and enforcement with a view to reducing the administrative cost of regulation[43]. Subsequently, Philip Hampton produced a report, which set out recommendations to reduce administrative burdens and improve the effectiveness of inspection and enforcement including the consolidation of a number of regulators into seven thematic regulatory bodies, with health and safety being one of the themes. It is proposed that the role of the Health and Safety Executive (HSE) should expand to include some of the work currently undertaken by the Engineering Inspectorate (EI) (presently part of the DTI). The Government has since committed to implementing the recommendations of the report, which should also result in a simplified inspection and enforcement regime for all NOs.

[43] http://www.hm-treasury.gov.uk/consultations_and_legislation/hampton/consult_hampton_index.cfm

10.8 HSE and DTI have now agreed that the supply continuity functions of the EI are to remain at DTI following the required transfer of functions in October 2006. It is not anticipated that these changes will adversely affect the manner in which the proposals presented in this Regulatory Impact Assessment are implemented, enforced and monitored.

11. IMPLEMENTATION AND DELIVERY PLAN

11.1 It is proposed that the Electricity Safety, Quality and Continuity (Amendment) Regulations 2005 come into force on 1 October 2006. All the amendments relating to BS7671, Renewable Energy Zones, and Tramways and Trolley Vehicle systems are to come into force on the same date.

11.2 Should option 4 be selected from the vegetation management proposals, it is further proposed that the coming into force of this particular requirement be delayed until 31 January 2009. This is to allow NOs sufficient time to demonstrate that their new vegetation management regimes meet the new resilience requirements.

11.3 In order to demonstrate compliance with the requirement by 31 January 2009, all DNOs and TNOs will be expected to have appropriate policies, procedures, resources and programmes in place. From that date, it is proposed all DNOs operate modest yet progressive programmes that bring their own high voltage networks up to the required resilient standard. It is expected that most of the focus will be on 11kV and 33kV networks, but circuits operating at other voltages may require treatment if use of ETR132 marks them as a higher priority. This will lead to circa 20% of such distribution high voltage networks to be resilient within 25 years (at a rate of circa 0.8% pa). In terms of transmission, it is expected that those networks will require less effort to reach the required standard, and full resilience is to be achieved within 3 years.

11.4 The ENA has recently confirmed publication of its new methodology for achieving improved network resilience (ETR132). Full industry adoption has also been confirmed, subject to adequate regulatory funding being put in place.

11.5 Work on a best practice guide (to improve communications and relations with the range of stakeholders that are key to securing a balanced vegetation management approach that minimises operational difficulties for all concerned) is due to commence in May 2006, with a view to publication and adoption by mid-2007. The code is expected to cover what amounts to good practice in areas such as: standards of workmanship, communications with landowners (and other stakeholders), compliance with environmental obligations and the risk assessment process.

11.6 Another key milestone is for the DTI to support Ofgem, and work with the ENA, to ascertain the optimal level of investment for resilience taking all constraints into consideration (including environmental and amenity factors). This is to ensure that there are no distortions brought into the current regulatory framework in relation to funding for Network Operator activities and also to minimise any unintended consequences in relation to the environment. It is anticipated that discussions between Industry and Ofgem will commence in mid-2006.

11.7 The DTI will also provide general guidance for the public and the industry in relation to the statutory powers available under the Electricity Act 1989 (as amended), via its website. The aims of this measure are two-fold:

- To provide clarity as to the extent of the statutory powers currently available to electricity companies in relation to tree felling or lopping, and
- To educate the public as to the merits of increased network resilience whilst also highlighting the environmental and social constraints that apply.

This measure should assist in convincing landowners and the general public about the need for this work. It is envisaged that work on this will start in July 2006 with a view to publishing guidance on the DTI website in mid-2007.

12. POST IMPLEMENTATION REVIEW

12.1 It is not proposed that the amendments relating to BS7671, Renewable Energy Zones, and Tramways and Trolley Vehicle systems are to be formally reviewed, as the impacts from those amendments are very likely to be insignificant and the risks are low.

12.2 The proposed amendment in relation to vegetation management is likely to have a significant impact on several fronts. As the date for the coming into force of the new requirement is likely to be 31 January 2009, it is proposed that a formal review of this measure is undertaken 2 years later (i.e. early in 2011). The principal aim of this review is to ensure that the measures are working as intended with no disproportionate social or environmental impacts. Such a review will necessitate professional arboricultural expertise to inform the assessment, which could result in a further cost to DTI in the region of £20k.

12.3 However, the impacts of all the proposed amendments will be continuously monitored in the intervening period as part of DTI's normal business operations. Normal activities include:

- Analysing responses to surveys being issued to DNOs affected by future storms,
- Responding to queries raised by consumers, and
- Investigating accidents and incidents.

13. SUMMARY & RECOMMENDATION

Vegetation Management

Table 11 below gives a brief summary of the relative merits of each of the four options considered.

Table 11 – Relative Merits of each of the options discussed

	Comments
Option 1 Do nothing	• Stronger and more frequent winds may be present in future. • Tree growing season increased. • Probable deterioration in electricity supply resilience in storms.
Option 2 Voluntary code of practice	• Some improvement in network resilience possible. • Full participation not guaranteed – previous experience would suggest that companies do not necessarily act on voluntary recommendations (i.e. Baldock Report 1982). • Enforcement unavailable.
Option 3 Amend ESQCR	• Enables companies to gradually bring about improvements sought via tailor made programmes that focus on specific barriers. • Number of faults caused by trees in non-storm conditions may be reduced by circa 900 pa. • Likely to save hundreds more tree related faults in storm conditions. • Initial cost to Industry of circa £17.3m pa. Equates to circa 0.1% increase in consumers' electricity bills. • Estimated benefits to industry from increased resilience likely to reach £12.33m pa in year 25. • This reduces net cost to industry to circa £4.75m pa by this stage. • Enforcement available and full participation assured. • Estimated cost to DTI for arboricultural expertise in monitoring NO compliance ranges from £5k to £20k on a bi-annual basis. • The initial formal review of the proposals likely to cost DTI in region of £20k in 2011.
Option 4 Amend ESQCR supported by code of practice	• Benefits as highlighted for Option 3 above, PLUS • Allows the opportunity for all stakeholders to be involved in the drawing up of such a standard. • Ensures consistent approach when implementing vegetation management programmes and should help mitigate any of the possible risks of damaging relations with landowners, local authorities and the public. • Code of Practice offers clarity to Network operators in terms of how they can comply with the new statutory requirement in practice.

The assessment has indicated that Options 2, 3 and 4 are very similar in terms of cost. Based on the assumptions and evidence produced in this document, it is felt that Options 3 and 4 will be much more effective in delivering the improvements sought in network reliability and resilience, as the issues of industry participation and enforcement are better addressed. Of the two options, Option 4 is the most preferable as it best addresses the environmental and social impacts considered earlier.

It is, therefore, recommended that Option 4 be adopted to enable full implementation and enforcement of supply continuity requirements in modern electricity markets.

BS7671 Amendment No2 and Renewable Energy Zones
It is recommended that the proposals associated with these issues also be adopted, as they will enable the ESQCR to keep pace with changes in the electricity markets.

Tramways, Trolley Vehicle Systems, and other modes of Guided Transport
It is also recommended that the proposal associated with this issue also be adopted to ensure such vehicle systems enjoy the same exemptions as for Railways.

14. GUIDANCE

There is guidance available on the current ESQCR on the DTI website at:
http://www.dti.gov.uk/files/file26709.pdf

The proposed amendments to the ESQCR will necessitate amendments to the guidance document. The guidance to the proposed amendments will be published within 3 months of the coming into force of the new regulations.

The current guidance document will then be updated, once the amendments come into force.

15. MINISTERIAL DECLARATION

Declaration:

I have read the Regulatory Impact Assessment and I am satisfied that the benefits justify the costs.

Signed by the Minister of State for Energy

Malcolm Wicks

Date **13 June 2006**

16. CONTACT POINT

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7 June 2006

ANNEX 1 – TREE RELATED FAULT DATA

DISTRIBUTION NETWORK
TOTALS

Low Voltage O/H lines	1990/1	1991/2	1992/3	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/2000	2000/1	2001/2	2002/3	2003/4	2004/5	15 year total
code 20 - growing or falling trees	3719	4058	5026	4481	2900	2802	3606	2964	4366	2783	3865	5455	4985	4352	6421	61783
code 21 - windbourne materials	248	280	388	337	142	102	143	233	488	68	103	124	114	72	124	2966
code 06 - wind and gale	4157	3493	4883	5763	3159	2009	3697	3260	4274	2165	2880	4658	6239	2560	6442	59639
total - code 06/20/21	8124	7831	10297	10581	6201	4913	7446	6457	9128	5016	6848	10237	11338	6984	12987	124388
total - all causes	40288	32117	32831	31552	21072	18062	20910	18016	23153	18015	21645	26669	27938	23439	28852	384559
% of faults due to growing/falling trees only	9.2	12.6	15.3	14.2	13.8	15.5	17.2	16.5	18.9	15.4	17.9	20.5	17.8	18.6	22.3	16.1

High Voltage O/H lines (1kV< Volts <22kV)	1990/1	1991/2	1992/3	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/2000	2000/1	2001/2	2002/3	2003/4	2004/5	15 year total
code 20 - growing or falling trees	1036	990	1281	1246	879	1039	1154	1086	1378	1103	1441	1944	2139	1727	2519	20962
code 21 - windbourne materials	349	311	409	317	234	229	301	298	315	211	257	305	295	225	233	4289
code 06 - wind and gale	2332	2093	3219	3574	1930	1184	2316	2702	3443	1856	1850	2738	2152	1610	3469	36468
total - code 06/20/21	3717	3394	4909	5137	3043	2452	3771	4086	5136	3170	3548	4987	4586	3562	6221	61719
total - all causes	20497	16147	22102	18642	15767	15331	14127	15236	15957	14100	14971	17277	16051	15959	17459	249623
% of faults due to growing/falling trees only	5.1	6.1	5.8	6.7	5.6	6.8	8.2	7.1	8.6	7.8	9.6	11.3	13.3	10.8	14.4	8.4

33kV O/H lines	1990/1	1991/2	1992/3	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/2000	2000/1	2001/2	2002/3	2003/4	2004/5	15 year total
code 20 - growing or falling trees	44	52	78	56	58	77	54	81	90	78	116	119	93	83	128	1207
code 21 - windbourne materials	22	30	19	20	17	18	27	19	20	11	21	15	23	12	21	295
code 06 - wind and gale	118	95	173	161	95	58	129	117	232	90	94	153	74	80	192	1861
total - code 06/20/21	184	177	270	237	170	153	210	217	342	179	231	287	190	175	341	3363
total - all causes	1626	1249	1669	1249	1266	1095	1111	1144	1224	971	1051	1131	990	956	1137	17869
% of faults due to growing/falling trees only	2.7	4.2	4.7	4.5	4.6	7.0	4.9	7.1	7.4	8.0	11.0	10.5	9.4	8.7	11.3	6.8

66kV O/H lines	1990/1	1991/2	1992/3	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/2000	2000/1	2001/2	2002/3	2003/4	2004/5	15 year total
code 20 - growing or falling trees	4	4	4	5	1	2	2	5	6	3	4	3	1	2	1	47
code 21 - windbourne materials	2	3	1	4	1	2	0	3	2	2	0	1	0	1	0	22
code 06 - wind and gale	17	4	8	6	3	2	1	9	8	5	1	3	2	0	6	75
total - code 06/20/21	23	11	13	15	5	6	3	17	16	10	5	7	3	3	7	144
total - all causes	141	74	94	80	73	90	54	50	45	46	30	54	21	26	30	908
% of faults due to growing/falling trees only	2.8	5.4	4.3	6.3	1.4	2.2	3.7	10.0	13.3	6.5	13.3	5.6	4.8	7.7	3.3	5.2

132kV O/H lines	1990/1	1991/2	1992/3	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/2000	2000/1	2001/2	2002/3	2003/4	2004/5	15 year total
code 20 - growing or falling trees	7	5	6	9	9	4	2	5	1	5	6	5	7	5	15	91
code 21 - windbourne materials	7	10	11	1	7	2	1	7	0	1	5	0	3	1	7	63
code 06 - wind and gale	23	25	75	38	24	3	27	27	68	25	12	15	11	0	9	382
total - code 06/20/21	37	40	92	48	40	9	30	39	69	31	23	20	21	6	31	536
total - all causes	709	232	390	313	286	324	128	233	252	214	205	116	99	65	114	3680
% of faults due to growing/falling trees only	1.0	2.2	1.5	2.9	3.1	1.2	1.6	2.1	0.4	2.3	2.9	4.3	7.1	7.7	13.2	2.5

TRANSMISSION NETWORK
TOTALS

275Kv O/H LINES	1990/1	1991/2	1992/3	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/2000	2000/1	2001/2	2002/3	2003/4	2004/5	15 YR TOTAL
code 20 - growing or falling trees	0	0	0	0	0	0	0	2	1	2	0	1	0	0	0	6
code 21 - windbourne materials	0	0	1	0	0	0	0	0	0	0	0	0	1	2	0	4
code 06 - wind and gale	0	0	52	2	5	0	16	21	35	1	1	38	1	2	5	179
total - code 20/21/06	0	0	53	2	5	0	16	23	36	3	1	39	2	4	5	189
total - all causes	0	0	111	24	15	50	79	70	75	40	61	71	50	38	35	719

400kV O/H lines	1990/1	1991/2	1992/3	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/2000	2000/1	2001/2	2002/3	2003/4	2004/5	15 YR TOTAL
code 20 - growing or falling trees	0	0	1	0	0	0	0	0	1	0	0	1	1	2	0	6
code 21 - windbourne materials	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
code 06 - wind and gale	0	0	16	2	0	9	26	33	106	11	22	69	9	3	8	314
total - code 20/21/06	0	0	17	2	0	10	26	33	107	11	22	70	10	5	8	321
total - all causes	0	0	47	21	0	53	201	115	225	69	138	119	66	54	82	1190

NOTE – DATA UNAVAILABLE FROM 2 TNOs OVER PERIOD 1990-1992, AND 1 TNO OVER PERIOD 1992-1995

ANNEX 2 – LIST OF CONSULTATION RESPONDENTS

Arboricultural Association –Utility Arboriculture Group
ADAS
Broadoak Services
Brockwells Forestry Ltd
BTS Group
CE Electric UK
Central Networks
Country Land and Business Association
David Thorman
EDF Energy
Energy Networks Association
Forestry & Timber Association
Fountains plc
Fujikura
Health and Safety Executive
Infoterra
John Duffield
Met Office
National Grid
NICEIC
Northumberland Group of Electricity Consumers
Office of the Deputy Prime Minister
Ofgem
Rail Safety & Standards Board
Scottish & Southern Energy
Scottish Natural Heritage
Scottish Power Manweb
Stirling Power Group
Tillhill
United Utilities
Western Power Distribution
Plus one confidential respondent