

# SP Energy Networks 2015–2023 Business Plan

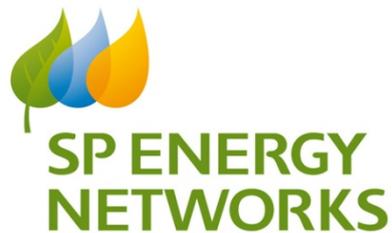
Updated March 2014

## Annex

**Written Evidence to Scottish Affairs Committee**

SP Energy Networks

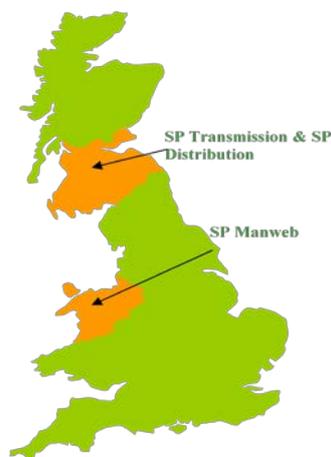
February 2012



## Written Evidence to Scottish Affairs Committee - 2<sup>nd</sup> February 2012

### SP Energy Networks (SPEN)

#### SP Transmission (SPT), SP Distribution (SPD), SP Manweb (SPM)



	SP Distribution	SP Transmission
132 /275/400 kV network length km	-	4100
132/275/400 kV network underground	-	-
132/275/400 kV network faults per annum	-	123
132/275/400 kV network faults per 100 km per annum	-	3.0
EHV network length km	5,700	-
EHV network underground (%)	53%	-
EHV network faults per annum	296	-
EHV network faults per 100 km per annum	5.2	-
EHV overhead network affected by trees(%)	10%	-
HV network length km	27,000	-
HV network underground (%)	47%	-
HV network faults per annum	2,547	-
HV network faults per 100 km per annum	9.4	-
HV overhead network affected by trees (%)	10%	-
LV network length km	30,900	-
LV network underground (%)	86%	-
LV network faults per annum	9,699	-
LV network faults per 100 km per annum	31.4	-
LV overhead network affected by trees (%)	33%	-
<b>Total Network length km</b>	<b>63,600</b>	<b>4,100</b>

Network & Fault Statistics from Typical Year<sup>1</sup>

<sup>1</sup> NAFIRS (National Fault and Interruptions Reporting Scheme) reports for 2008/09. Transmission - 132kV/275kV/400kV, Distribution – 33kV Extra High Voltage (EHV), 11kV High Voltage (HV), and 415V/230v Low Voltage (LV)

## 1.0 Executive summary:

- 1.1 SP Energy Networks (SPEN) has a strong focus on customer service<sup>2</sup> and is PAS 55 Accredited for our asset management processes, an internationally recognised standard. Within the regulatory framework we operate under, SPEN has made significant investment to ensure the network is resilient to storms, while also containing costs to customers. We requested and obtained increased investment allowances (+40 to 50%) from Ofgem to improve network performance through asset modernisation, maintenance, tree cutting and greater remote control and we continuously seek feedback from our stakeholders to support the investment plans that we put forward.
- 1.2 SPEN recognises the impacts that outages can have upon customers, especially under storm conditions where outages can be prolonged. Keeping customers informed of progress under severe storm conditions is challenging in the initial stages given the sheer scale of the damage that has to be assessed, continuing access problems and adverse weather.
- 1.3 2011 was the worst year for storms for 11 years with 6 exceptional events<sup>3</sup>. Our network and processes were rigorously tested as a result. Following any storm we complete a comprehensive review of our emergency processes and implement any recommendations that arise.
- 1.4 On 3<sup>rd</sup> January the Met Office confirmed that we experienced the worst storm in 13 years and equal worst in 44 years, with structural damage to properties, transportation and other utilities wide spread across our area. Our Network experienced:**
- a) *1,174 EHV, HV and LV faults, involving 40,000 man hours to repair*
  - b) *30 times the normal daily average of HV faults,*
  - c) *135,000 customers off supply, 70,000 at peak, none more than 5 days (600 customers),*
  - d) *70 transmission faults (60% of annual average in 1 day). Only one incident affected customers, for a total of 3 minutes, due to debris being blown on to electrical equipment in a substation.*
  - e) *Our investment and improved response developed in the last 10 years meant the impact of this storm was dramatically reduced compared to 1998, the last comparable event, with 33% fewer faults, 42% fewer customers off supply, longest period off supply cut by 50%*
- 1.5 We are currently conducting a detailed storm review, engaging staff, customers and stakeholders to test our existing processes; this will be completed on 2 March 2012.
- 1.6 We recognise the difficulties our customers face during these events and the importance of effective communication to allow customers, who are able to, to make alternative arrangements. During and since the January event:**
- a) We liaised throughout with local authorities to co-ordinate support efforts
  - b) We put a specific focus on vulnerable customers impacted
  - c) From Thursday 5<sup>th</sup> Jan we offered accommodation & meals to more than 2000 households who would be off supply after 9pm and hot meals for customers due on by 9pm
  - d) A Compensation Bureau is established and is proactively contacting customers off supply more than 48 hours plus an online claim facility is available (see appendix 1).

<sup>2</sup> Ranked 3<sup>rd</sup> and 5<sup>th</sup> in Ofgem customer service league tables for 2010/11

<sup>3</sup> Exceptional events defined by Ofgem as more than 8 times the normal daily average high voltage faults, introduced in 2000

## 2.0 Investment in our Scottish networks

2.1 In 2000 SPEN began a major investment cycle to replace a network that was installed in the period 1950-1970<sup>4</sup> (modern equivalent asset value of £15 billion). This investment has been improving resilience (to storms and flooding), restoration times, and advancing tree cutting and maintenance. SPEN has increased investment by a further 40-50% consecutively at the last 2 two distribution price control reviews (2005 and 2010) to modernise our networks. In Transmission the increases have been even more significant at 3 times our current regulatory asset value (RAV, £1Bn). To justify this investment SPEN and our Regulator (Ofgem) conducted extensive stakeholder engagement to inform our plans.

- a) In SP Transmission from 2007 to end of 2021 we will have invested £1.4 billion to modernise our network (£400m to date).
- b) In SP Distribution since our last serious event we have invested £250 million in renewing Distribution overhead lines, rebuilding 1,000km of EHV and HV overhead lines, and between 2010 and 2015 we will invest a further £500 million in renewing and strengthening our network.
- c) In addition to this SPEN incurs £20 million per annum to cut trees (safety & resilience), inspect and manage hazards on our overhead lines. Involving managing vegetation on 80,000 spans and inspecting 2,500km of our overhead lines.

2.2 **This investment is critical to renewing the network. We believe that our proposals deliver strong performance at an appropriate cost to the consumer. This year we will be commencing further stakeholder engagement for the next distribution price control (to set our revenues from 2015 to 2023) and we will again be looking for customers views to inform our plans.**

2.3 Cost to Consumer: According to Ofgem network charges represent 4% (Transmission) and 17% (Distribution) of the average £424 per annum electricity bill domestic customers receive from electricity Suppliers<sup>5</sup>. If we were to underground SP Distribution's overhead network it would cost over £5bn, and add more than £225 p.a. (ca 50%) to each customer's bill, before accounting for additional road opening costs and the cost of repairs that contribute to the higher full life cycle costs of underground cables.

### 3.0 Overhead line network strategy:

3.1 Following previous storms, and in particular the 1998 Boxing Day event, SPEN took the decision to improve the resilience of our overhead line network to storm conditions. *This led to a revised strategy for our overhead network being built into our investment plans. This strategy includes:*

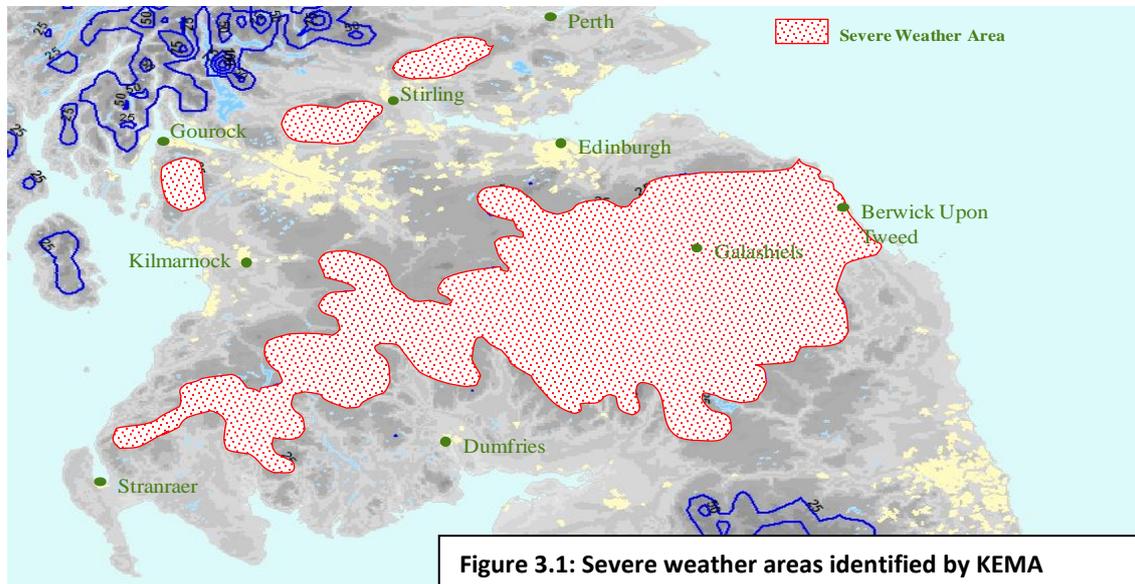
- a) *An enhanced engineering specification for severe weather areas*
- b) *Prioritisation of poor performing circuits for investment*
- c) *Enhanced network resilience to falling trees*
- d) *Greater automation and remote control to reduce time off supply*

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<sup>4</sup> Consistent with all U.K.s electricity transmission & distribution infrastructure

<sup>5</sup> <http://www.ofgem.gov.uk/Media/FactSheets/Documents1/updatedhouseholdbillsjan11.pdf>

- 3.2 Our strategy was based on a review of the primary causes of faults and extended restoration times. We also engaged an independent engineering consultancy (KEMA) to identify severe weather areas across our network (Figure 2.1); this is used in conjunction with performance information to target our investment programme at worst affected areas.



- 3.3 After implementing our strategy, KEMA were asked back to review the validity of our programme and strategy by assessing if it was having the expected impact<sup>6</sup>. KEMA's report concluded '*the effectiveness of the improvement policies in addressing main line storm resilience has been demonstrated and the targeted improvement programme should continue*'. Appendix 2 provides an example of a typical investment of this nature.
- 3.4 During 2010 to 2015 this continuing strategy will deliver a programme targeting 6800km of wood pole overhead lines (33% of the network) and 10% (ca 2,000km) of the network will be made compliant with the storm resilient tree cutting specification (ETR 132).

***Having analysed our strategy we can also demonstrate that it has:***

- a) Reduced numbers of customers affected by severe weather events***
- b) Reduced time to restoration for customers affected***
- c) Delivered benefits during normal weather operation***

Our investment shows a direct improvement in overall system performance achieved between 1999/2000 and 2010/11 for all voltage levels<sup>7</sup>. Today an average customer will experience an outage once every three years, for a duration of approximately one and a half hours, equating to a reliability of supply of around 99.999%. 10 years ago the same customer would experience a fault once every two years for a duration closer to two hours on average.

- 3.5 The charts in Figure 2.2 and 2.3 below detail the numbers of customers off supply and high voltage faults at any one time for historic storms.

<sup>6</sup> Kema Limited – Scottishpower An assessment of HV overhead asset storm resilience – 19<sup>th</sup> Feb 2007

<sup>7</sup> Includes all fault types, detailed system performance reports are available from Ofgem's homepage

**Figure 3.2: Comparative Storm Performance – Customers off supply at any**

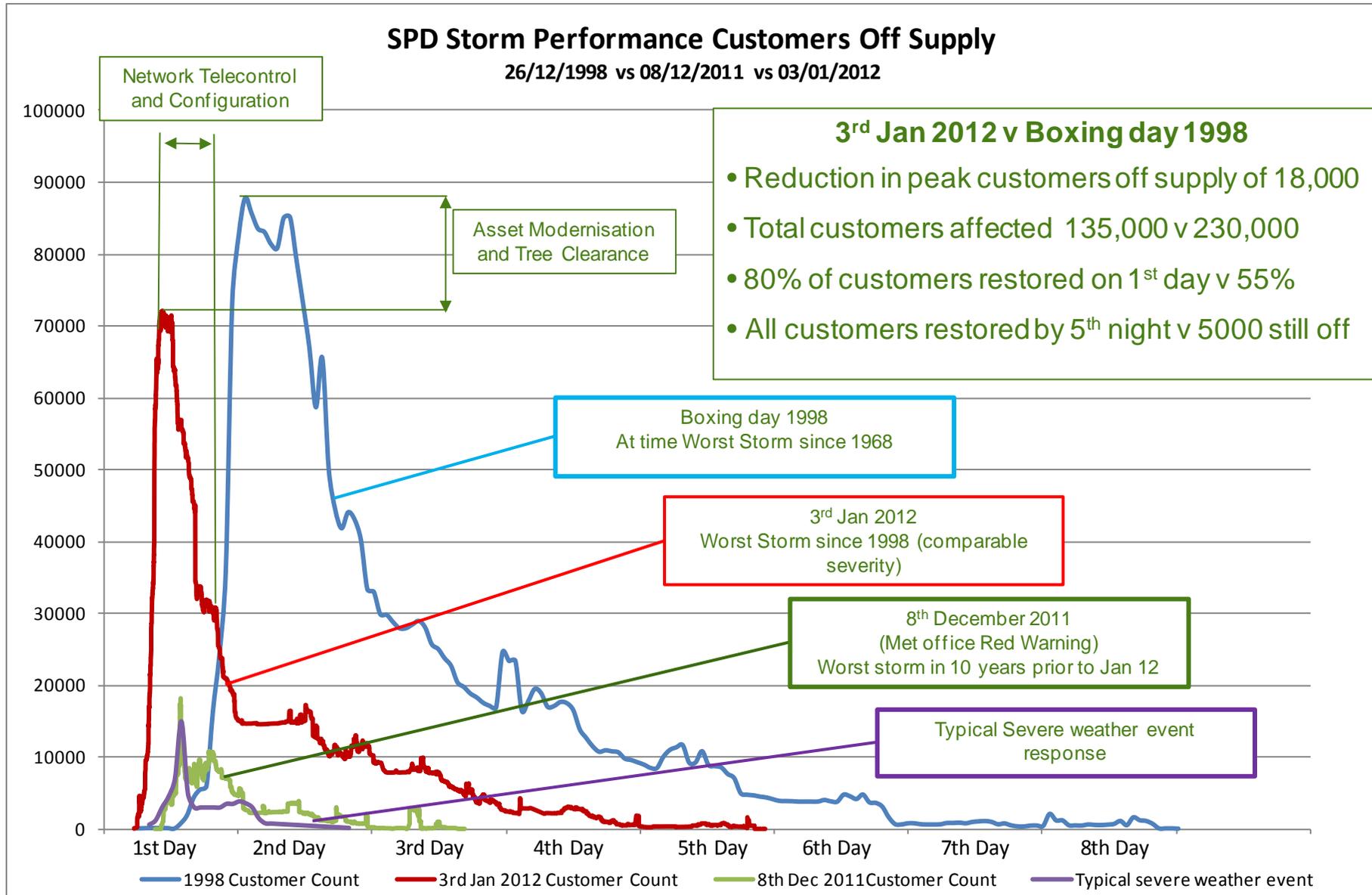
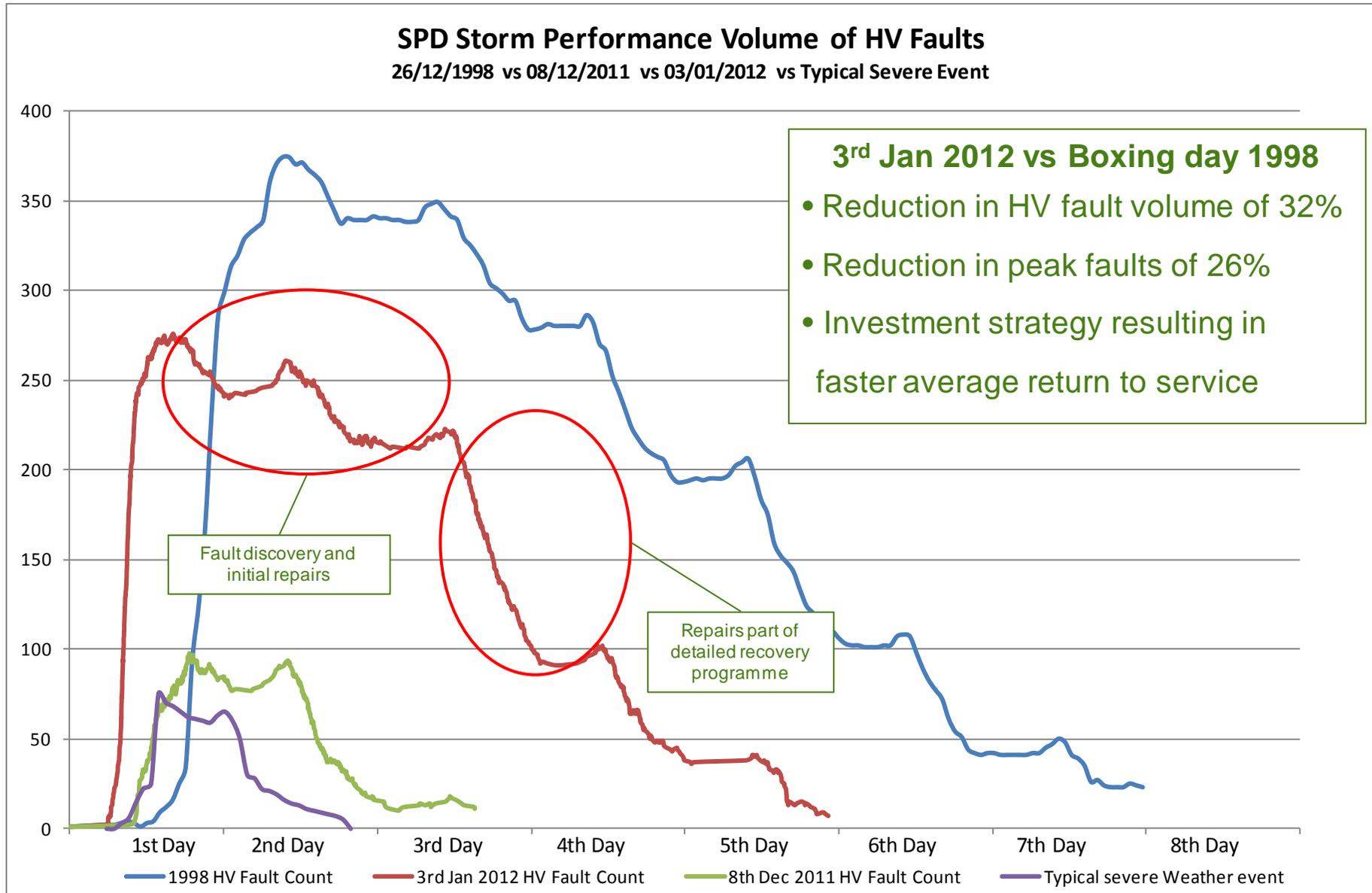


Figure 3.3: Comparative Storm Performance – High Voltage faults on network at any one



3.6 From records we are able to compare our performance in January to the last comparable event in 1998 (which at that time was the worst storm in 30 years). *Our investment and improved response means that the impacts of these events are much reduced since the 1990s. The improvement between 1998 and 2012 provides the strong evidence of this see table 2.4.*

	26 Dec 1998	3 Jan 2012	
<b>Faults</b>	1,731	1,174	32% fewer faults
<b>Customers affected</b>	230,000	135,000	41% fewer customers
<b>Customers at peak</b>	90,000	70,000	22% fewer customers
<b>Length of impact</b>	9,874 customers off for 4 nights 550 customers off for 7 nights	600 customers off for 4 nights No customers off longer than 4 nights	

**Table 3.1: Comparison of customer impacts 1998 against 2012**

#### 4.0 Recent extreme weather events

4.1 The table below (Table 2.5<sup>8</sup>) shows that our Transmission and EHV network remains resilient in these types of extreme weather, with very few faults and then for very short periods only. The majority of customers are affected by HV overhead faults, 87% on 3<sup>rd</sup> January, as a result of different network design necessary at lower voltages to enable customers to be connected efficiently.

Date	Nature	EHV and above faults	EHV faults affecting customers	HV Faults	Total faults	Customers affected	
08/01/08	Gales	15	2	150	371	43,700	
31/01/08	Gales	6	0	119	305	28,400	
30/03/10	Snow	25	6	139	340	69,300	
03/02/11	Gales	9	2	84	235	25,700	
23/05/11	Gales	10	3	191	470	56,800	
12/09/11	Gales	2	0	78	141	28,300	
08/12/11	Gales	21	2	197	460	63,800	At time worst storm in 10 years
13/12/11	Gales	5	1	77	134	29,600	
28/12/11	Gales	4	1	97	343	15,400	
03/01/12	Gales	75	3	525	1,174	135,000	Worst storm since 1998

**Table 3.2: Recent Extreme Weather Events**

<sup>8</sup> Customer numbers associated with distribution faults as reported to Ofgem

## 5.0 Emergency Procedures and Severe Weather Event Management

- 5.1 In addition to our investment programmes SPEN has focussed on ensuring that when severe weather events occur, our emergency procedures deliver an effective response. Emergency procedures are initiated when severe weather is forecast and our key staff hold clearly defined emergency roles.
- 5.2 Our advance preparations for severe weather includes the activities listed below, each of which will be escalated dependent on the probability, severity and locality of the weather forecast:
- a) Declare alert level as early warning of storms,
  - b) Cancel planned work to maximise resource availability and network security,
  - c) Increased resources, internal and contracting staff
  - d) Head office Emergency Action Centre (EAC) co-ordinates efforts across company, sourcing additional resources and communicating with external stakeholders,
  - e) 6 Zone EACs to manage local repair efforts and reporting,
  - f) We also perform storm simulations and post storm reviews to test processes and practice
- 5.3 When an event occurs we look to optimise restoration of supplies as follows:
- a) Network switching to restore supplies without repair work.
  - b) Assess network damage and prioritise repair efforts to restore supplies to maximum number of customers in minimum time.
  - c) It is our experience that as storm recovery progresses the work to repair individual faults typically does not reduce but the number of customers restored by each repair decreases.
- 5.4 Although the worst of the weather may have passed from the customers perception, under storm conditions it is also common that the weather conditions hinder our repair and restoration efforts for a number of reasons ranging from access to the fact that the weather conditions our staff are working in can continue to be challenging, especially when they have been working long shifts.

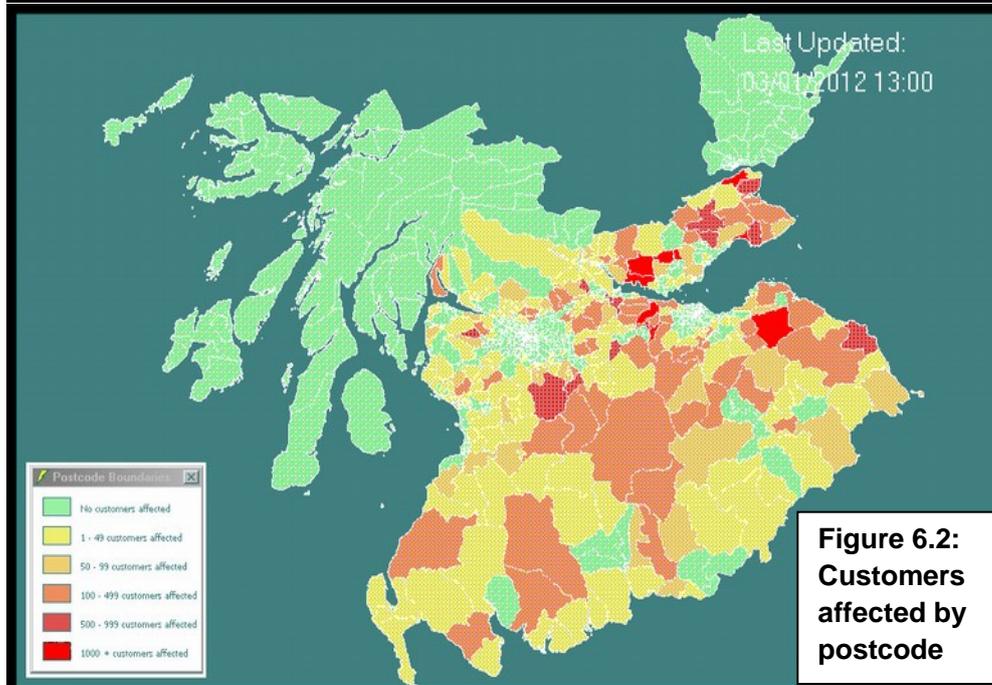
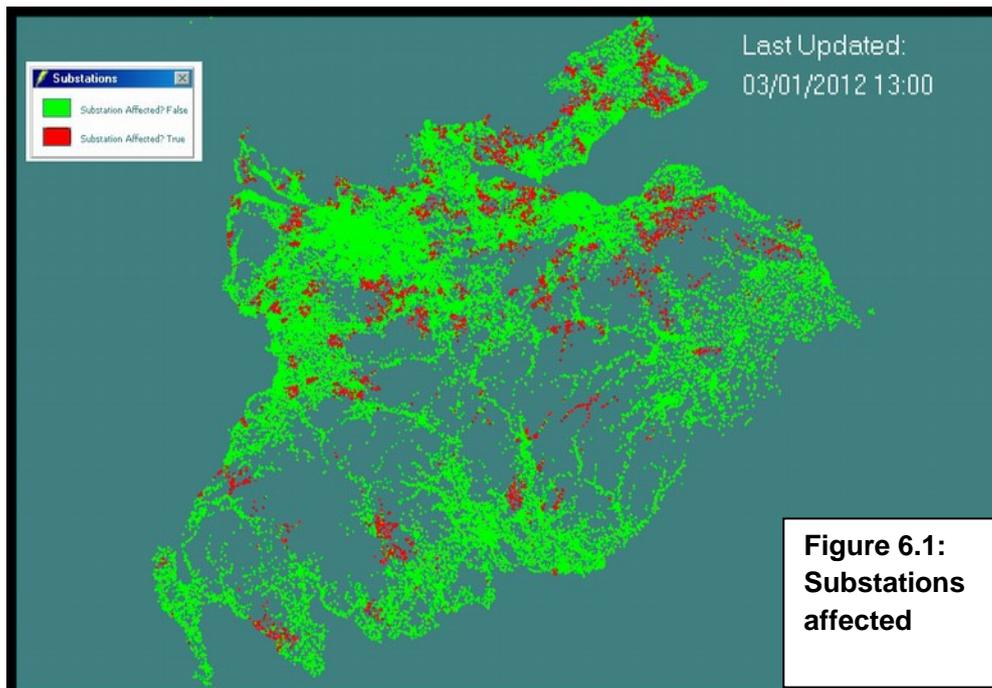
## 6.0 Management of the 3<sup>rd</sup> Jan 2012 event

- 6.1 Following the amber alert issued by the Met Office, SPEN mobilised 350 field staff and opened its central control Emergency Action Centre (EAC) at head office at 0830. At 08:14am the Met Office changed its weather warning from amber to red<sup>9</sup>. SPEN responded quickly and:
- a) Increased mobilised field staff to 850
  - b) Brought in additional contractors & teams from network companies in England, Wales and Ireland
  - c) Local EACs across all zones were opened and were liaising with our central EAC
    - Ayrshire, Central & Fife, Dumfries, Edinburgh & Borders, Glasgow, Lanarkshire
  - d) Engaged non operational staff in damage assessment,
  - e) Engaged Helicopters to carry out post storm assessment (*2,500km of lines patrolled*)

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<sup>9</sup> Defined by Met office <http://www.metoffice.gov.uk/weather/uk/advice/>

- 6.2 The main impact of the storm occurred over a relatively short period of time on the 3<sup>rd</sup> January which affected customers across our Scottish network<sup>10</sup>. SPEN staff worked tirelessly in dreadful conditions in the days following the storm to restore supplies, working 18 hour days in adverse conditions, including strong winds and horizontal rain. In some areas work was suspended on the 4<sup>th</sup> January due to gusts over 65mph causing unsafe working conditions, although these remained challenging throughout the repair period.
- 6.3 Figures 5.1 and 5.2 show the substations off supply and customers affected by postcode at 13:00 on 3<sup>rd</sup> of January when 45,000 customers were off supply.



<sup>10</sup> [http://www.metoffice.gov.uk/climate/uk/interesting/2012\\_janwind/](http://www.metoffice.gov.uk/climate/uk/interesting/2012_janwind/)

## **7.0 Liaison with other agencies**

- 7.1 Our Head Office Emergency Action Centre (EAC) provides updates to officials of the Scottish Government, DECC and Ofgem. Our Customer Services Director and EAC staff engaged with the Scottish Government Resilience Room meeting throughout the 3<sup>rd</sup> Jan 2012 storm event. The meeting involved strategic members from relevant agencies e.g. Scottish Government, Local Authorities, SPEN, SSE, BT, Scottish Water, Transport Scotland, Police Service. Our Public Affair & Communications teams provided regular updates to the 44 MPs and 95 MSPs whose constituents we serve (following the recent storm we have identified two updates to our database resulting from a recent by-election and a boundary change). Our Communications team provide updates to the press and facilitate media interviews to communicate to our wider customer base.
- 7.2 Our Customer Liaison Officers work with local authorities and other third parties, such as charities, to ensure we can co-ordinate our efforts for our customers during storms.

## **8.0 Communication with our customers**

- 8.1 Our customer service operations coordinates the call centre activities from Kirkintilloch and is supported by our Prenton office to minimise wait times for our 3.5million customers. Operational Control Centres in the same locations work closely with the Call Centre to restore supplies as quickly as possible through remote switching and dispatching field-staff.
- 8.2 As field-staff progress faults they communicate with the Control Centres to ensure up to date information is available for customers. However under severe storm conditions the level of accuracy is impacted by the scale of the task of assessing the damage and repairs.
- 8.3 Customer service strategy under normal circumstances:
- a) Interactive Voice Response (IVR) messaging services provide up to the minute information;
  - b) Inform what is happening and expected power restoration time; however
  - c) Customers can speak to an agent to discuss this or report safety issues.
  - d) We also update customers through outbound calls and text messaging.
  - e) We endeavour to call customers after a power outage to ensure the service delivered was to a high standard and obtain feedback to improve customer service.
  - f) A dedicated team deal with complaints to ensure quick resolution and customer updates.
- 8.4 Customer service strategy in storms has the following key differences:
- a) Emergency Action centres (EACs) co-ordinate information;
  - b) Dedicated EAC roles to ensure information from field staff is continuously updated.
  - c) Staff specifically assigned to ensure customers can access the most up to date information;
  - d) Staffing in our Control Rooms, Incident Creation teams and Call Centres are all increased ;
  - e) Staff are engaged from our wider business to assist outbound calling customers;
  - f) When the interruption is prolonged our teams proactively offer hot meals and hotel accommodation to customers as they call and make outbound calls to offer these.

8.5 Since April 2011 we have received:

- a) 470,000 calls of which 89,000 (c.19%) were 3<sup>rd</sup>- 5<sup>th</sup> Jan
- b) Average 1,500 calls per day but 30,000 per day 3<sup>rd</sup>-5<sup>th</sup> Jan
- c) Normal call success rate 99.5% in average 6.2 seconds
- d) Recent storm 91.5% success rate in average 145 seconds

8.6 From Thursday 5<sup>th</sup> January we offered more than 2,000 households hotel accommodation and hot meals if they were going to remain off supply beyond 9pm, households expected to be on supply by 9pm were also offered payment for hot meals.

## 9.0 Services for Vulnerable Customers:

9.1 We have 126,000 vulnerable customers on our Priority Services Register. These customers are contacted as a priority, when affected by a supply interruption, in order to understand their specific needs and to arrange assistance for them if necessary. We proactively seek information from customers who contact our call centres to ensure we update and expand our register.

## 10.0 Customer Compensation

10.1 Every 5 years (moving to 8 years from 2015) our regulator Ofgem reviews our investment plans and provides revenue allowances to fund agreed levels of investment and operating costs, and puts in place mandatory compensation levels for customers. Ofgem conducts 'willingness to pay' research to inform these decisions. In December 2009 Ofgem concluded domestic customers should receive a £54 payment if they are off supply for more than 18 hours outside exceptional events<sup>11</sup>.

10.2 For Category 2 large exceptional events<sup>12</sup>, compensation is due to customers off supply for a continuous period of 48 hours.

10.3 Customers affected by the 3<sup>rd</sup> January storm will receive:

- a) £27 for the first 48 hours, further £27 for each additional 12 hours, up to £216.
- b) In addition we are paying for hot meals and hotels for worst affected households.
- c) *Additional compensation for vulnerable customers who required specialist care on an individual basis.*

10.4 The rules implemented by Ofgem require that customers claim this compensation, however we are contacting customers pro-actively to advise them of their entitlement and confirm payment details. We have set up a dedicated storm bureau to manage this process for our customers (see appendix 1)

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<sup>11</sup> Defined by Ofgem as causing > 8 times daily average number of high voltage faults

<sup>12</sup> Defined by Ofgem as causing >13 times daily average number of high voltage faults

## **11.0 Conclusions**

- 11.1 SPEN is committed to delivering significant levels of investment to accommodate the demands of all our connected customers.
- 11.2 We have been focussing on continuously improving our network resilience and operational response in the face of emergencies since the 1990s.
- 11.3 We take seriously our obligations to our customers and the difficulties they face during prolonged outages and seek to learn from every event that affects us. These 'lessons learnt' also feature in our price review submissions.
- 11.4 We welcome the opportunity to provide evidence to the Scottish Affairs Select Committee.
- 11.5 Finally, in appendix 4 we have included pictures of both the general damage the storm caused and pictures of the specific damage caused to our network.

**Appendix Index:**

**Appendix 1 – Dedicated Storm bureau**

**Appendix 2 – Example of investment strategy**

**Appendix 3 – Tree cutting for Safety and Tree Clearance for Storm Resilience**

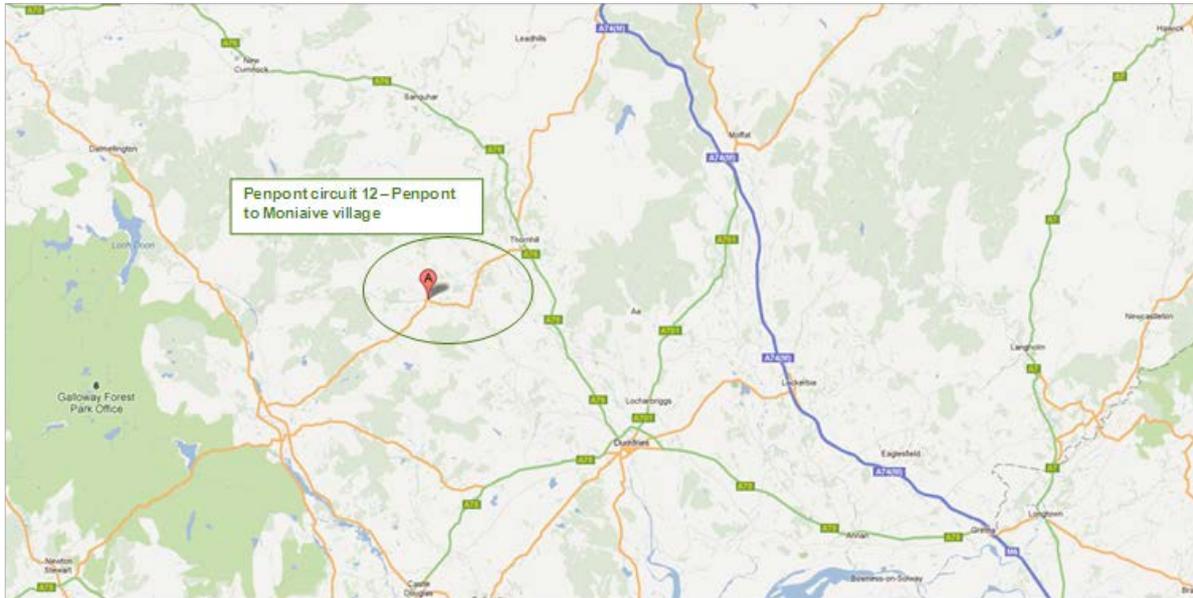
**Appendix 4 – Pictures showing general and network damage on 3<sup>rd</sup> January 2012**

## **Appendix 1 – Dedicated Storm bureau**

- a) Storm bureau operational from 23rd January and all staff made aware.
- b) Updates on **[www.scottishpower.com](http://www.scottishpower.com)** and **[www.spenergynetworks.co.uk](http://www.spenergynetworks.co.uk)**
- c) Storm Database created within customer contact tracking system to track and report claims.
- d) Letters issued proactively (including follow up) to clarify details for cheque payment.
- e) Dedicated telephone number (0800 027 7016) set up for 3 weeks to deal with these enquiries (Mon-Fri 0830-1645)
- f) Online claims form live until 7th April. With full instructions and dedicated mail box.

## Appendix 2 – Example of investment strategy

### Dumfries, Penpont Primary substation circuit 12



- a) 48.2km of 11kV overhead lines (11.5km main line, 36.7km spur lines)
- b) 549 customers
- c) Between 2003 and 2009 this circuit had on average 4 faults per annum at various locations leading to around 620 customer interruptions per annum

In 2010 this circuit was targeted for modernisation:-

- a) Main line rebuilt to a resilient specification & cut to ETR 132 tree compliance
- b) Spur lines refurbished to remove defects
- c) Circuit upgraded to our current telecontrol and automation specification

This was completed for a cost of £1.1m and the subsequent performance is as follows:

April 2010 to 8<sup>th</sup> Dec 2011

- a) Zero HV faults on this circuit

December 8<sup>th</sup> 2011

- a) Three transient (non damage) faults,
- b) Resulting from flying debris or clashing conductors,
- c) Customers restored by switching without repair.

3<sup>rd</sup> January 2012

- a) This circuit was unaffected by the storm.

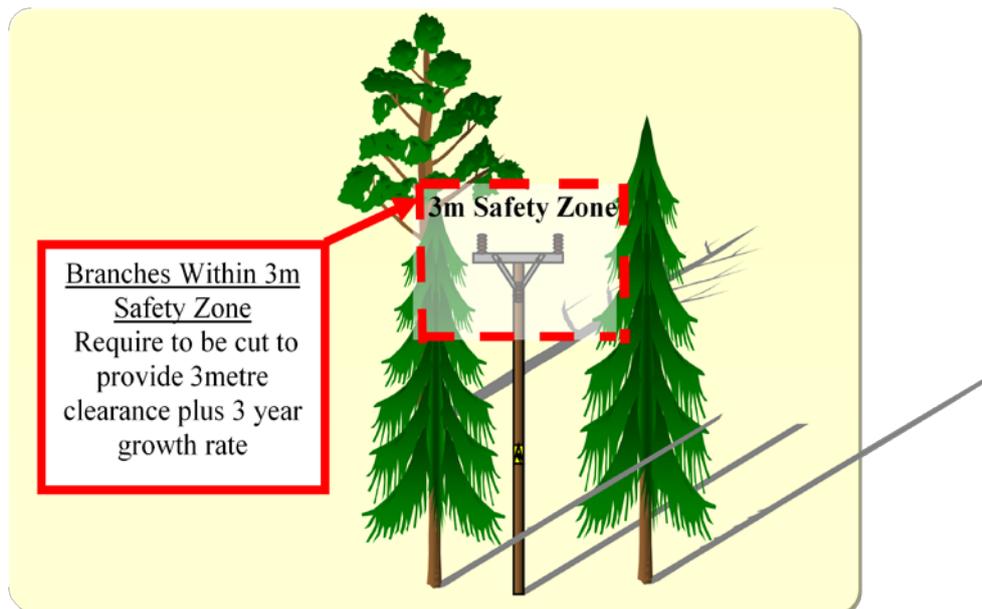
## Appendix 3 – Tree cutting for Safety and Tree Clearance for Storm Resilience

**SPEN carries out tree cutting activities for two different purposes which are laid down in the *ELECTRICITY SAFETY, QUALITY AND CONTINUITY (AMENDMENT) REGULATIONS 2006*:**

- *Tree cutting for safety*
- *Tree clearance for network resilience*

### Safety Distance tree cutting

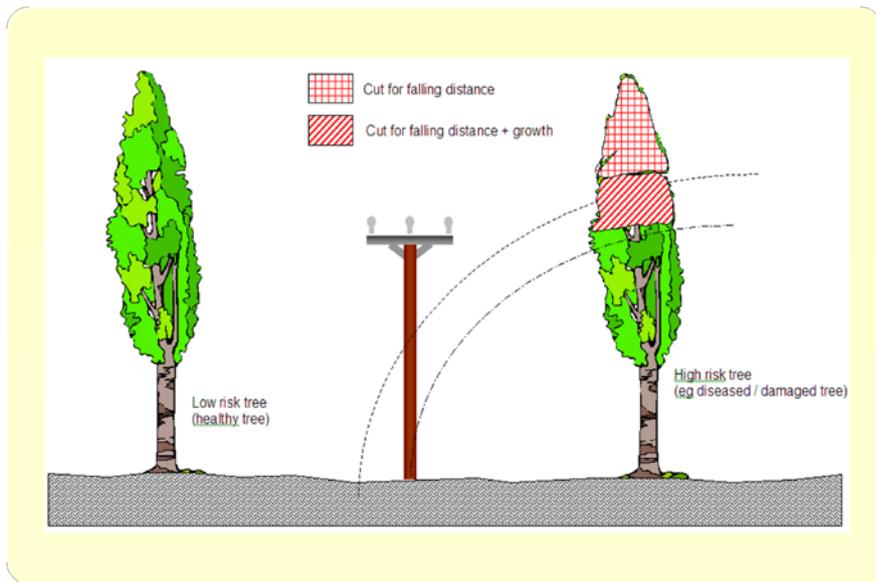
This involves tree cutting to provide a safe area around existing Overhead Line circuits to prevent the public from making contact with live Overhead Line circuits. There are also performance benefits for customer interruptions due to removing close proximity trees.



- a) Industry standard (ENATS 43-8) specifies overhead line safety clearances
- b) Compliance is achieved through a cyclic vegetation management programme
- c) Tree types and growth rates captured on vegetation management software
- d) Typical 1 in 3 years cut to maintain required safety clearance

## Storm Resilience tree clearance

This involves the felling of trees which are within falling distance of existing Overhead Line circuits.



Specified in 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 – March 2006

DTI Officials worked with the Electricity Industry (SPEN led the industry working group) in the development and publication of a new risk based methodology (ETR132) for determining where and when to best prioritise vegetation management work for the purposes of improving network resilience.

The obligation on electricity distribution companies is to have an additional 20% of their network compliant by 2035, which the DTI considered was balanced and proportionate to ensure the environmental, social and regulatory impacts were not overlooked<sup>13</sup>.

ETR132 reflects the practices that SPEN has been implementing since 1998. Had SPEN waited until 2009 to begin to implement the requirements of ETR132 we expect that recent storms would have resulted in greater disruption to customers.

<sup>13</sup> THE ELECTRICITY SAFETY, QUALITY AND CONTINUITY (AMENDMENT) REGULATIONS 2006 GOVERNMENT RESPONSE

Full document at: <http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/files/file33408.pdf>

Appendix 4 – Pictures showing general and network damage on 3<sup>rd</sup> January 2012

