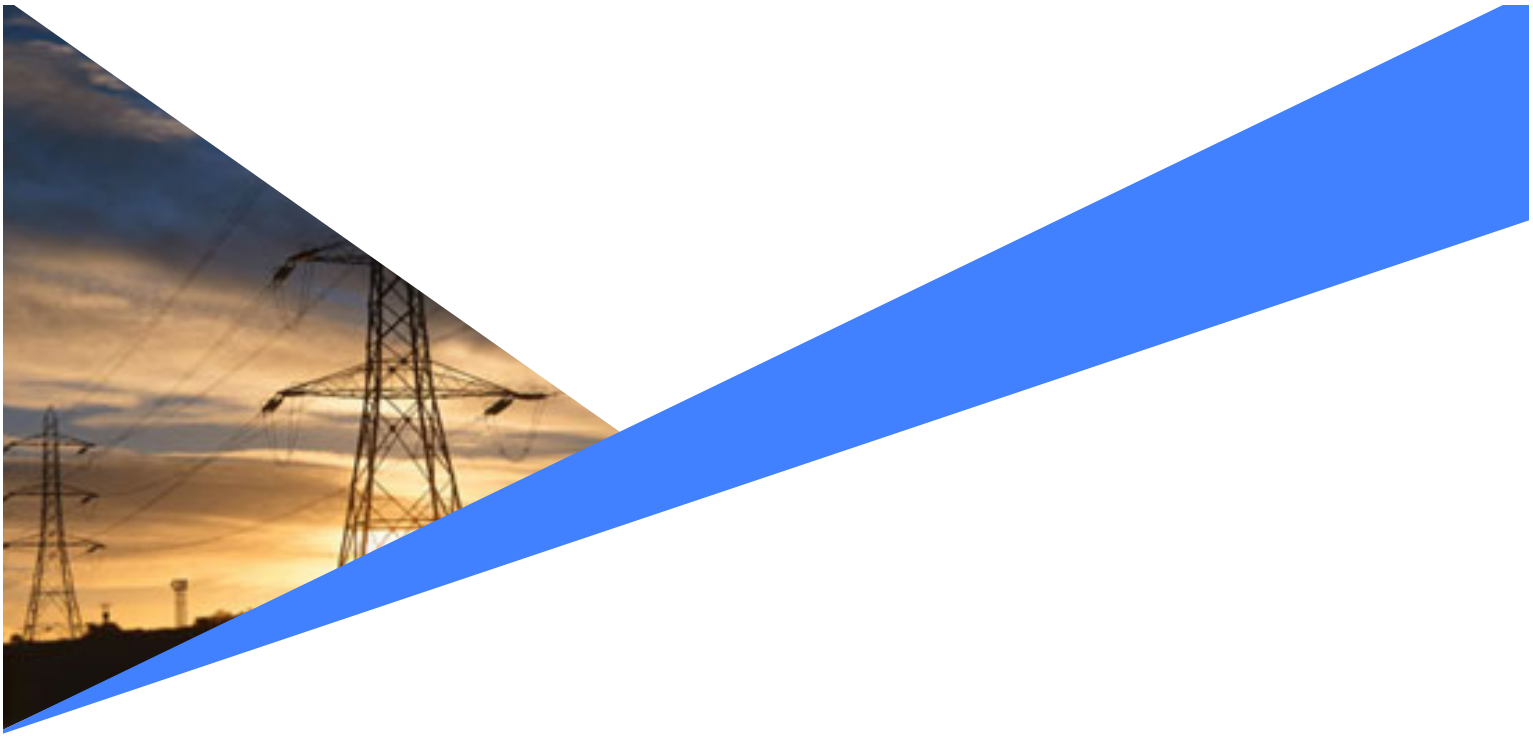

energypeople

Stage 2 Review of Distribution Network Operators' performance during the December 2013 storms

Appendices to Report prepared by energypeople limited for Ofgem

July 2014

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Contents

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Appendix 1 Electricity North West Limited (ENWL)

1 Summary

ENWL experienced a busy Christmas period, though this was not as busy as the 5/6 December event. The Christmas storm hit ENWL on 27 December, resulting in 297 network incidents, interrupting electricity supplies to 46,879 customers on its network. 22 customers were without supply for more than 48 hours, the worst case being 63 hours.

ENWL has a telephony system focused on its single call centre in Warrington, which is a High Volume Call Answering service (HVCA) provided by 21st Century communications. The indications from the statistics provided are that the system, as configured, coped with the peak demand over the Christmas period. It is apparent that there is inconsistency between the measurement of KM4 between DNOs, with ENWL returning a standard 3 second time for call placement on a regular basis. Over Christmas 2013 the system did not allow callers to queue for an advisor so waiting times could not be measured. When no advisor was free callers were given a choice of contact to obtain information by call back, text or social media.

ENWL was able to increase its call centre staff level adequately to meet the increase in demand and reports that it received no customer complaints regarding the inability to queue. As an action arising from the DECC review ENWL has now introduced a queuing facility.

ENWL, the only single licence holder and one of the smaller overhead line licensed areas operates 5% of the country's overhead line networks and, in total, employs 5% of the country's skilled overhead line staff, with significant dependence on contractors.

ENWL reports it was able to stand down contract staff over Christmas to enable them to support other DNOs but it did import 14 staff from NPG on 27 December.

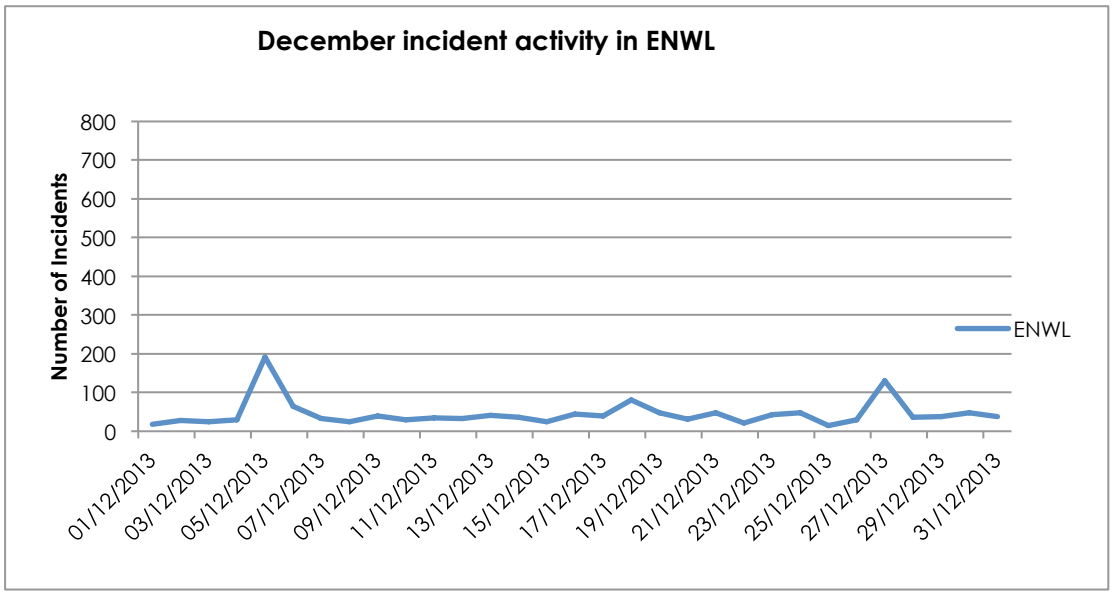
2 The company

Electricity North West Limited (ENWL) is the only DNO remaining which covers a single licensed area. As the electricity DNO for the North West of England it delivers electricity to 2.4 million customers. As discussed below and reviewed more generally in the main report, this requires the company to focus its plans on maximising self-sufficiency, especially during the early stages of an emergency event, and to take an active interest in ensuring mutual aid arrangements among companies work as effectively as possible on the occasion of a sustained period of severe weather.

The company has a service area of 12,510 square kilometres covering a diverse range of terrain, from rural Cumbria, to industrial and urban populations including Manchester. ENWL's aggregate network consists of about 13,000 km of overhead lines, 44,000 km of underground cables, 86,000 items of switchgear, and 34,000 transformers. It employs 1700 staff.

3 The event

3.1 December incident activity in ENWL

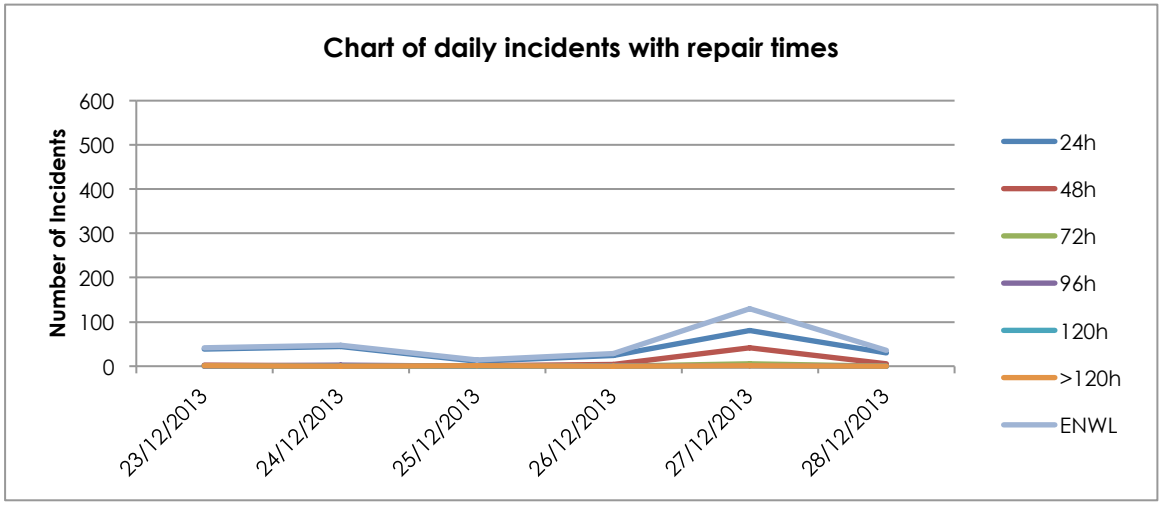


3.2 Scale of the event in ENWL

ENWL was first impacted on 27 December with the event profile below:

Number of short interruptions (< 3mins)	50,148
Number of incidents	297
Number of Customers losing supply (3mins and over)	46,879
Number restored within 1 hour	21,705 (46.3%)
Number restored within 24 hours	45,873 (97.9%)
Number restored within 48 hours	46,879(100%)
Number without supply > 48 hours	22
Customer longest without supply	63.4 hours

3.3 Incidents per day with repair periods



3.4 Customers interrupted (3mins and over) and restoration times

4 Planning and preparedness

4.1 In house plans and procedures

The company has plans and procedures covering the preparation for and response to a weather related system emergency. Electrical incidents are managed in line with its Code of Practice 604, which was updated and issued as version 8 in May 2013. The October 2013 Storms did not affect the North West as much as some areas and, as the company managed well, ENWL saw no reason to review the plan at that time as the current version was only 6 months old.

ENWL's Incident Management Plan has been developed over a number of years during which it has continually evolved to encompass new learning, technology or process opportunities. The company is therefore of the opinion that, whist there will always be a need to regularly review and update such plans, it is currently fit for purpose.

The Incident Management Plan is constructed so as to call for the establishment of a number of task teams that have specific roles. Within these task teams there are

specific duties and sub task teams. In order to ensure these task teams are adequately manned, ENWL routinely allocates names to roles ahead of any predicted forecast of disruption. These include a Duty Manager, who is responsible for monitoring and alerting the business to any forthcoming operational event, and a duty press officer, who is on call 24-hours a day. When a weather forecast or a flood warning that has the possibility of causing disruption is received the Duty Manager sends out a Stage 1 warning to managers throughout the company asking them to start making preparations to manage an Electrical Incident Centre (EIC); ENWL's central coordinating management centre in an incident; manage Local Incident Centres (LIC); increase call-taking capability; make plans to manage the control centre staffing levels; check staff availability; and place contract partners in a state of readiness to assist if required. In line with industry best practice, the EIC and LICs (up to a maximum of 5) have the same view of ENWL's Trouble Management System (TMS). The LIC manages local resources and faults and updates the information on the TMS.

ENWL normally holds incident preparedness sessions in late autumn of each year prior to the on-set of winter storms, which are designed to ensure that the key staff involved in the management of incidents understand their roles and any changes that have been made to ENWL's incident plans. This did not happen in the autumn of 2013 because ENWL had opened its EIC and LICs on a number of occasions and had thus been able to test systems and procedures in actual response mode. The company does however plan to hold an incident test in 2014, ahead of the winter 2014/15 period, to ensure that all the learning and best practice sharing that has occurred following the December 2013 storms is implemented and tested thoroughly.

ENWL operated in incident response mode throughout most of December 2013 due to the prolonged nature of the bad weather. Whilst there were only two exceptional events (5/6 December and 26/27 December) the company experienced a significant number of days when HV fault volumes were more than double the daily average.

While there was therefore no formal review of the Code of Practice between the two exceptional events, ENWL did (and does) hold incident reviews after every exceptional event, as a result of which it put in place some of the learning points from the early December review in advance of the forecast bad weather for later in December. These included:

- Increasing the number of staff on standby from Christmas Eve;
- Placing its contract partners on standby for the forecast bad weather;
- Introducing additional staff into the local incident centre management process; and
- Bringing contract partner management staff into the local incident centres to assist with the management of their teams.

4.2 Weather forecasting

ENWL uses the Met Office forecasting service. Along with the experience of others, real confidence typically only comes with the three day forecast. Arising from the sharing of good practice from the DECC review, the company will be taking a 10 day general forecast along with its detailed shorter term forecast and, via NEWSAC, sharing weather alerts with other DNOs[1].

[1] DECC review, recommendation F1 – Weather forecasting and escalation triggers.

ENWL suffered two Category 2 severe weather events between 1 December 2013 and early January 2014 (5/6 and 26/27 December); this is unusual in itself. However, during the same period, wind speeds in excess of 60 mph were experienced on 14 days. This is highly unusual and effectively placed ENWL in incident preparedness mode during the whole of the period. The forecast that caused most concern was for 24 December but, as can be seen from the charts above, this caused a 'busy day' rather than major disruption.

5 Response and restoration

5.1 Restoration strategy

Following the accepted approach, the company adopted a phased approach; remote restoration; switched and local restoration; and physical repair.

Automation has been deployed extensively on ENWL's overhead network with the top 1000 circuits having been, or are in the process of, being automated. All GVRs and main line ABS switches will be remote-controlled and automated by the end of financial year 2015. During the period 23 to 28 December, ENWL estimates that 14,146 of its customers' supplies were restored by software automation which runs centrally on its control room system. ENWL also reports 91,083 Short Interruptions (SIs) that were restored by embedded auto-reclosers on the system affecting a further 36,002 customers, i.e. some customers suffered more than one SI.

Along with the experience of others, ENWL reports that automation and remote switching has been an important contributor to improving restoration performance when compared to the situation in 2002.

The control room management system provides real time information on the number of customers off supply, which is available to staff throughout the company, in order that progress can be monitored. Event reviews are provided for in the company's plan and those typically take place four times daily, depending on the scale and duration of the event.

ENWL adopts a mixed solution to the provision of mobile generation; plant is part owned and part secured through a contract with Generator Power Ltd. During 5/6 December; 7 incident stages were restored by the use of generators, restoring 183 customers. During the 26/27 December event, 12 incident stages were restored by the use of generators, restoring 440 customers.

Clearing faults and restoring customers within an acceptable timescale has benefits down the line in terms of lessening the levels of welfare and additional customer support required.

5.2 Effectiveness

As shown in the data, restoration performance during the December 26/27 event was similar to that for the 5/6 December event, indicating that the Christmas holiday period did not appear to have a significant impact on effectiveness. Given the difficulty of climbing on 27 December because of weather conditions, the most critical period for staff availability was on Saturday 28 and Sunday 29 December when the bulk of physical repairs were required. The ability to call staff out (and access contractors) on the two key public holidays was not therefore stress tested as it was for other DNOs.

Following what has become accepted good practice, a long-term (i.e. >24 hours) view of resource availability is taken, meaning that the company will generally stand field staff down at 22:00 hours during an incident to ensure availability the

following day. Activity through the night is normally restricted to switched restoration and emergency response.

ENWL made use of NEWSAC, releasing regular contractors to UKPN at Christmas. For the post-Christmas event (27 December onwards in ENWL) the company elected to take staff from NPG rather than call back their contractors from UKPN so as to maximise continuity of restoration in the south.

The company regards NEWSAC as an effective forum through which DNOs are able to offer mutual aid; from ENWL's perspective NEWSAC has been effective in moving resources to places of need during previous events. The issue that all DNOs faced in December 2013 was the widespread national nature of the forecast severe weather, which led to DNOs being reluctant to release resource until the effects of the severe weather had been mitigated.

As explained in the main report, ENWL is one of the companies that see a possible tension between DNOs directing their resources to help other DNOs and the stronger Guaranteed Standards (GS) incentives in RIIO-ED1. The company has a concern that the increase in financial penalties on DNOs through a strengthened GS regime is likely to cause DNOs to focus much more on eliminating all their own faults and to anticipate future damage, before agreeing to release resources to other DNOs where the level of damage could be more significant.

6 Keeping customers informed

6.1 Overview

All DNOs recognise the importance of keeping customers informed of progress during supply interruptions and that this can only be achieved by the effective use of technology combined with the skills and experience of the staff receiving customer calls. The only way to be able talk to people to provide the service expected is through an adequate number of well trained staff supported by very effective messaging systems of adequate capacity.

DNOs have all implemented similar call handling and messaging platforms differing only in technical aspects and the way DNOs configure them. The technical design feature aspects of all DNOs' systems are adequate and fit for purpose so the performance of their call handling, other than short term technical faults, is characterised by the quality of messages made available to customers and the number of advisors available to take calls from customers who are not satisfied that a message has delivered the service they require.

The review visit to ENWL enabled meetings with ENWL's staff at all levels directly involved during the Christmas emergency including customer-facing call advisors. ENWL operates a telephony platform for call handling and messaging processes for keeping customers informed.

Assessment process

ENWL's technology and call handling / messaging processes were assessed. Keeping customers informed is dependent upon accurate and timely information. The accessibility and delivery aspects of information are provided through the call handling system, website and social media. The quality of the information is dependent upon the telephony platform and the implementation of robust processes delivered by skilled staff.

6.2 Planning and preparedness

ENWL was operating its emergency events Code of Practice 604 from early December due to the prolonged period of bad weather. From the incident review following the exceptional event, which occurred over 5/6 December ENWL placed some measures in advance of the forecast for possible severe weather later in the month.

The performance of the call handling, associated processes and systems over 5 and 6 December has not been reviewed, but it is reported that all systems performed as expected.

6.3 Acquiring information

Early indications of the potential damage caused by the winds are alerts from the network control centre systems which continuously monitor the higher voltage networks. Indications of loss of supplies are passed from the control centre systems that provide fault information to its control room management system (CRMS), which has links to the HVCA with interactive voice response (IVR) facility. The CRMS exchanges information with the trouble management system (TMS) which call advisors can use to view faults and add customer details, and field staff can provide fault update information.

The IVR then creates a geographically tailored message available for incoming customer calls. Previous customer calls registered in the trouble management system enable the messaging team to get details of those faults not alerted through the control centre route. Fault details are verified and an appropriate IVR message sent to the HVCA. The same information is also available to the contact centre advisors who can inform customers who require to speak with someone.

Key information comes from field teams working on repairs, some of whom now use handheld devices to directly enter and update details; location, nature, impact on public safety and restoration progress updates. There remains a dependence on more conventional communications for other teams.

ENWL reported there were no major issues with the communication systems between field staff and control centre or dispatch during the storm period although the northwest area did experience minor disruption to mobile network coverage. Field communication with control always has the potential for this to become a bottleneck due to the disparity of numbers between field and control centre staff. It also has to be recognised that, in the first hour of an emergency, with the technology now available a control engineer may be more effective in restoring customer supplies by using remote controlled tele-switching than in dealing with more localised operations carried-out in the field.

6.4 Communicating the information

Incident information available to customers is taken direct from the trouble management system ensuring that it is as consistent, accurate and as up-to-date as is achievable.

ENWL communicates with customers through the customers' channel of choice; inbound telephony with options for speech contact; IVR speech; SMS messaging, outbound calls; website; Facebook and Twitter.

6.5 Systems and their resilience

The call handling and associated systems provide all users with the same information so that staff anywhere in the company can access it. The BT Network IVR service platform and HVCA system have high capacity and high service availability.

High capacity, high-speed digital communications provide secure connections between key locations and offices. The call handling and messaging systems have the capacity to handle large volumes of telephone traffic and to delivery messages via the IVR effectively. No issues affecting the telephony and associated systems and communications networks were experienced during the Christmas period.

6.6 Resourcing

ENWL's main contact centre is located in Warrington with a standby located in Preston. During emergency incidents the contact centre call handling team is supported by staff from other teams within the contact centre; complaints handling, call quality advisors and the contact centre trainer.

6.7 CTI platform effectiveness

The review has shown that the ENWL telephony platform and communication networks provide a secure and flexible platform for supporting the contact centre and its overflow facilities. The call handling and messaging systems have the capacity to handle large volumes of telephone traffic. No issues affecting the operation of internal or service providers' systems and communications networks were experienced during the Christmas period.

Call advisor staffing effectiveness

To assess the adequacy of advisor staffing the following measures were considered:

- The abandonment rate;
- Wait-time; the mean time taken for response by an advisor; and
- The number of advisors answering calls.

Answering customer calls

Answering all customers' calls by a call advisor, with a reasonable answer time, depends upon matching the number of advisors to the call volume, which is highly volatile, with significant and sudden peaks in the event of a system incident. In the situation of the volume of incoming calls exceeding the number of free advisors callers are offered the choice of service from ENWL. Customers may opt to leave a voice message, and elect to receive a call back or a text message response from ENWL. The availability of an advisor becoming free is dependent on the duration of the call and any associated process work, such as updating the company's incident database.

The customer has the option to abandon the call at any time while waiting; the longer the wait the more likely the call will be abandoned. Based on an acceptable wait-time[2] the abandonment rate (AR) is often used as a service measure, the target being appropriate to the service offered. In the case of emergency lines a very low abandonment rate must be targeted.

[2] Variable under the control of the Contact Centre

The abandonment rate is the ratio of the number of abandoned calls to the total number of queued calls. The abandonment rate is not just dependent upon answer time; type of call, time of day, caller tolerance, and availability of alternatives may all be factors.

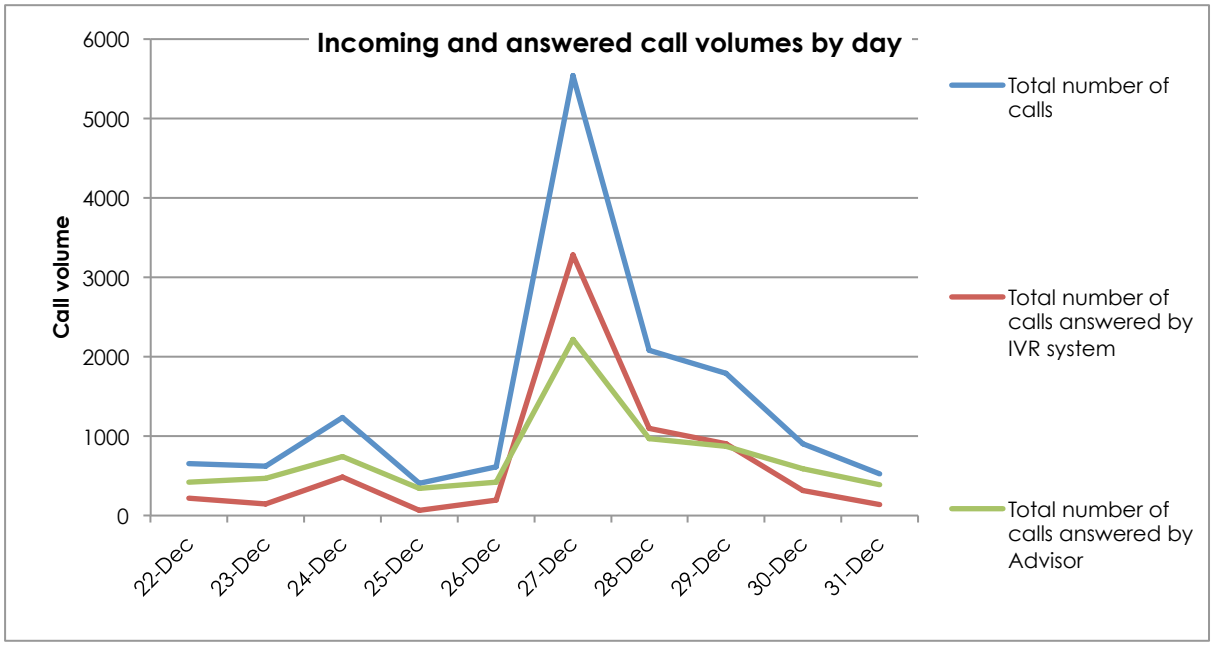


Chart 1 – Association between incoming and answered calls ENWL

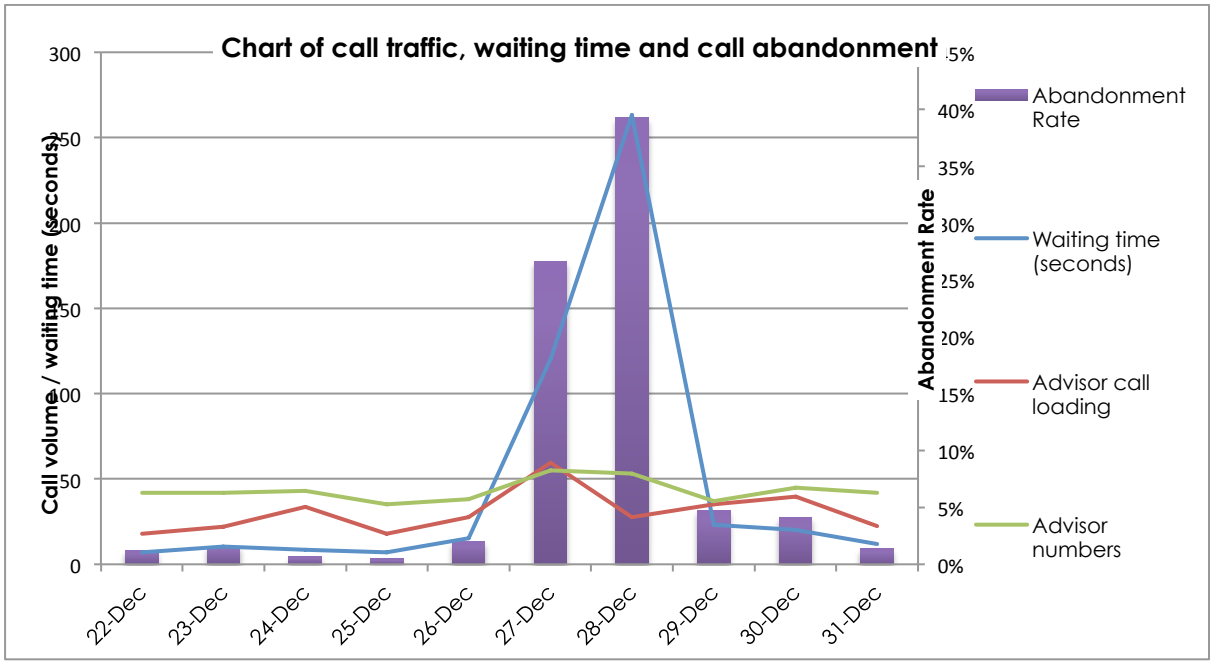


Chart 2 Association of factors to abandoned calls

KM1	2082		KM2/KM1	53%
KM2	1098		KM3/KM1	47%
KM3	969		KM5/KM1	≈1%
KM5	15		Total	100%

Table 1 – Peak total call volumes - 27 December 2013

Observations

From Table 1, 53% of calls were IVR-answered and 47% answered by advisors, with less than 1% of unsuccessful calls, a near 50% split between IVR and advisor-answered calls.

Chart 2 shows the waiting time at a constant 3 seconds. It was confirmed by ENWL that the measuring of KM4 (mean time taken for response by an agent) is at the point where the incoming call is placed by the IVR and directed to a person or a message, i.e. the system process time which is always a constant 3 seconds. In December ENWL's telephony system did not provide for call queuing, so waiting time was not measurable. Monitoring the trend of the queue waiting time in relation to the service target and hence matching advisor numbers to call volumes is the normal practice. One of the consequences of a mismatch is normally an increase in the abandonment rate. However, in the case of ENWL over the Christmas period, the abandonment rate was below 2%, in all but one day.

7 Internal review, evaluation and follow up

7.1 In-house reviews

ENWL reviewed its performance after the 5/6 December storms and its emergency response. ENWL also conducted a review of the second event and submitted data to both the Ofgem stage 1 and DECC reviews, together with a follow-up report to Ofgem.

As a consequence, ENWL is implementing changes to its holiday period cover, both for its own and its contract staff. ENWL is requiring more of its own staff to be contractually available over the Christmas and New Year period, and will use the weather forecast to decide if such cover is also appropriate over Easter and other Bank Holidays. The company is also working on arrangements with its contractors to make the provision of resources at these times more formal and commercial, with clarity over what resources ENWL has first call on.

7.2 Network condition and resilience

ENWL's review of the faults experienced indicates that they were mainly related to windborne debris. The company is therefore of the opinion that there is no case for major upgrading of its overhead line specifications, nor for wholesale undergrounding provided tree trimming continues to be managed in line with good industry practice. Fine tuning to meet specific issues is undertaken and there will always be exceptions where specific problems reveal the need for tactical undergrounding. ENWL will continue to deal with these on a case by case basis. ENWL's policies and processes with respect to vegetation management are in line with industry standards.

7.3 Learning from others

Along with other DNOs, the company is participating in delivering the DECC action plans and taking forward actions which will enhance future performance.

Specifically: it is has clarified and refined the role of scouts (reconnaissance teams); is reviewing the deployment of generation on the first day of an incident; is reviewing liaison between incident managers and the company's executive leadership team; is implementing clearer internal rules on GS payment and customer compensation; is reassessing and then ensuring adequate depth of staff cover for holiday periods; and is increasing the availability of media trained spokespeople.

As the statistics indicate, ENWL coped with the two December events which were significant but not on the scale experienced across the south of England. The company operates a single licence for the north west of England, which means that it needs to plan for resilience in the event of a widespread severe weather emergency; at these times it may be unable to access supplementary resources through NEWSAC or bring in additional contractors with sufficient speed to satisfy the expectations of customers.

8 Review of performance against success factors

Ref	Activity	Review of ENWL's performance
SF1	Emergency plans and advance preparation	❑ ENWL operates a single distribution licence with little or no in-house capacity to transfer staff in from outside of its licence area, other than via NEWSAC. It therefore has a single set of emergency plans designed around its in-house resource and estimated ability to call on contractors and NEWSAC for support. ❑ ENWL has one of the smallest overhead line networks in the UK outside London. ❑ ENWL has robust plans in place covering all aspects of an emergency event. These plans (COP604) were externally reviewed as far back as 2002 and have been modified based on event experience and to utilise technological and organisational developments since then. The most recent routine review, prior to December 2013, was May 2013. ❑ The plans enabled the two events during December to be managed effectively.
SF2	Weather forecasts, prediction of impact and resource requirements	❑ ENWL receives weather forecasts from the Met Office with a seven day window. Where storms are forecast, they are tracked / monitored daily and the business moved from business as usual to a response readiness footing, with planned work stood down, if the prediction enters the 24 hour horizon. ENWL has now adopted the agreed national best practice approach of a 10 day forecast. ❑ Reports are communicated to all senior staff with the responsibility for initiating ENWL's Emergency Response Procedure (COP 604).

Ref	Activity	Review of ENWL's performance
		❑ COP 604 provides an indication of the likely impact using empirical data by voltage and region against wind speeds, which experience has shown to be a good indicator.
SF3	Early reaction and mobilisation	❑ At the peak of the event on 5/6 December, ENWL deployed 95% of its overhead line staff; about half were deployed on 27 December. Significant numbers of contract overhead line staff were not deployed in the first incident (they were allowed to respond to urgent requests for resources elsewhere). About 25% of available contract overhead line staff were deployed in the second incident. ❑ The pattern of restoration response to both incidents was broadly similar.
SF4	System automation to restore bulk customer numbers	❑ ENWL has invested £40 million in network automation which enabled 5,929 and 9,445 customers to have their supply restored within 3 minutes during the first and second incidents respectively. ❑ Further remote switching, coupled with local switching by engineers, contributed to the restoration performance shown in the chart above.
SF5	Telephone response & answering service.	❑ With ENWL's call-handling arrangement, when no advisor was free, callers were given a choice of contact for information: by call back, text or social media. A queue facility has now been introduced. More generally, the company is under a requirement to review its capacity and resilience arising from the DECC review (action C3).
SF6	Gathering field information	❑ Field scouting staff, comprising skilled engineering staff, are used to identify damage locations and the resources required to carry out a repair, thus ensuring overhead line staff are despatched with a well-researched job pack. ❑ Wherever possible ENWL pairs a scout with someone who is Competent under its Safety Rules to isolate and make safe supplies where a dangerous situation may exist. ❑ In line with recognised best practice, ENWL is reviewing its use of scouting, including sending photographs of damage back to support preparation of job packs is being further enhanced and formalised in ENWL's emergency plans.

Ref	Activity	Review of ENWL's performance
SF7	Processing Information	❑ In common with most DNOs, ENWL has invested heavily in technology to support the processing of information from the network, from customers and from staff to provide an overall picture of the damage to its networks, the likely work required to carry out repairs and to estimate restoration times. The volume of information to be processed is massive and all DNOs are significantly better placed to handle this than they were 10 years ago. ❑ Technology is developing and changing rapidly and there is always likely to be one DNO having a slightly later version of a system than another, or using features differently to link in with other in-house legacy systems. Information from ENWL's network management system is available to other staff engaged in managing the event.
SF8	Rapid dispatch of switching resource to site	❑ ENWL is able to dispatch resources quickly and to switching points on the network to deliver maximum benefit to customer restoration. ❑ Staff are equipped with electronic navigational aids also marked up with switch locations to avoid time loss in locating switching points in rural areas.
SF9	Ensure adequate resources in terms of people, transport materials	❑ Plans provide for winter preparedness, the checking of emergency materials and associated activities.
SF10	Adequate overhead line staff	❑ ENWL is the only DNO to hold a single distribution network licence, and outside London it has one of the smallest overhead line networks, amounting to 5% of the country's overhead lines. It employs, or has arrangements in place with contractors, such that it can utilise about 5% of the country's overhead line staff. ❑ Being a single licence holder with a relatively small overhead line staff ENWL is not well placed to augment its resources at short notice. It is therefore dependant on being able to access additional contractors rapidly or accessing staff through NEWSAC.

Ref	Activity	Review of ENWL's performance
SF11	Management of repairs	❑ ENWL's control room management system provides real time information on the number of customers affected by each fault. This information is available to staff throughout the company, allowing restoration priorities to be established. ❑ ENWL prioritises repairs to achieve maximum numbers of customers restored to supply in the shortest possible time after restoration that can be achieved by switching is complete. ❑ The phased approach adopted is described above. Prioritisation generally takes the order of highest voltage faults impacting supplies first, working down through voltage levels, followed by restoration of strategic duplicate circuits that have faulted and impose a system risk but are currently not affecting customer supplies.
SF12	Manage the event tail	❑ ENWL acquired resources via NEWSAC to support its restoration efforts.
SF13	Mobile Generation	❑ ENWL made use of mobile generation early. It relies on a mixed solution; part owned and part contracted in.
SF14	Use of all media channels to communicate with customers	❑ ENWL uses social media (Facebook and Twitter), local press, SMS text, voice blasts, its employees on site and its web site to provide customers with updates and information. ❑ ENWL conducted broadcast media interviews, handled around 20 media calls per day, issuing regular updates when new information became available. The company's focus was on providing spokespeople for local radio interviews as its recognises that this is a vital way for customers to keep up to date.
SF15	Provide realistic estimates of repair duration and informing customers	❑ All DNOs recognise the need to give the most accurate estimates of restoration times that they can. Over-optimistic repair times tend to antagonise customers, particularly when not updated and restoration times are not achieved. Equally, unduly pessimistic times are not helpful to customers as there are likely to be instances of customers making alternative arrangements only to find the supply is restored soon after leaving home or incurring expense. ❑ ENWL's Trouble Management System (TMS) provides up to date information on estimated restoration times. This information is provided by field staff to the Local Incident Centres, which are responsible for updating TMS with new information each time there is a change of status on repair work. TMS information is available to the central Electrical Incident Centre (EIC), which is responsible for providing customer updates (in line with SF14).

Ref	Activity	Review of ENWL's performance
		❑ The process is under review, arising from action C9 of the DECC review.
SF16	Provide feedback to customers with regular updates	❑ This is done via the channels described in SF14 above.
SF17	Local presence and community contacts	❑ The processes in SF 14 and 15 were considered sufficient for the scale of events experienced In December.
S18	Provide adequate welfare facilities to PSR customers from start of event and to all customers who are without supply for more than 48 hours	❑ ENWL telephones all customers who are registered on its priority services register to understand any specific issues and, during the incidents the company provided generation to some medically dependent customers and offered generators to other vulnerable customers. ❑ ENWL has contracts in place to provide support through the British Red Cross for vulnerable customers and Air Liquide for customers with Oxygen requirements. ENWL's teams and support contracts can provide vulnerable customers with a care pack that includes a torch, plug in phones, hats, blankets and hand warmers.

Appendix 2 Northern Powergrid (NPg)

1 Summary

NPg experienced a very busy period; though not an exceptionally severe weather event or series of events; over Christmas 2013, which resulted in 487 network incidents, interrupting electricity supplies to 68,340 customers on its two networks. Restoration was complete within 31.98 hours.

The 5/6 December event and associated coastal surge was a more significant event and more testing.

NPg's telephony system is focused on its primary contact centres and is available to staff across the company. The system coped with the increased traffic associated with the Christmas event, though demand was not at the level experienced by those companies with licensed areas in the south, which suffered the most severe weather. The automatic messaging system appears to have satisfied customers. NPg was able to adequately increase its contact centre staff level to cope with the increase in demand.

NPg operates 10% of the GB overhead line networks and in total employs 8.5% of the GB skilled overhead line strength, with a significant dependence on contractors, which make up more than half its overhead line workforce. It supported other companies' efforts via NEWSAC.`

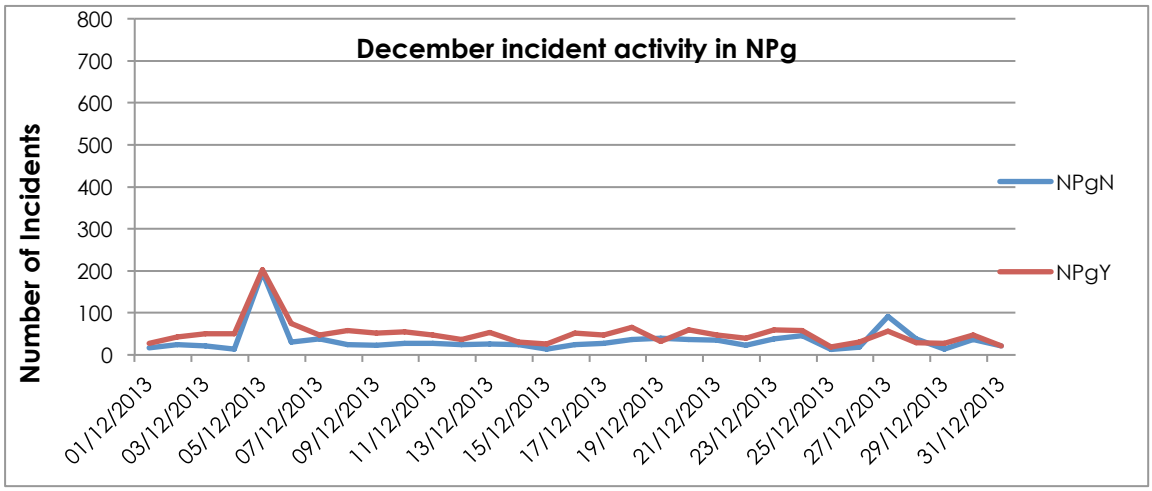
2 The company

Northern Powergrid holds two distribution licences and operates through two subsidiary companies; Northern Powergrid (Northeast) Limited (NPgN) serving the North East of England and Northern Powergrid (Yorkshire) plc (NPgY) serving Yorkshire, Humberside and northern Lincolnshire.

NPg delivers electricity to over 3.8 million domestic and business customers, covering an area of some 25,000 square kilometres. The network consists of more than 31,000 substations, around 91,000 kilometres of overhead line and underground cables. The company employs approximately 2,300 staff.

3 The event

3.1 December Incident Activity in NPg



3.2 Scale of the event in NPg[3]

NPgN was first impacted on 27 December with the event profile below:

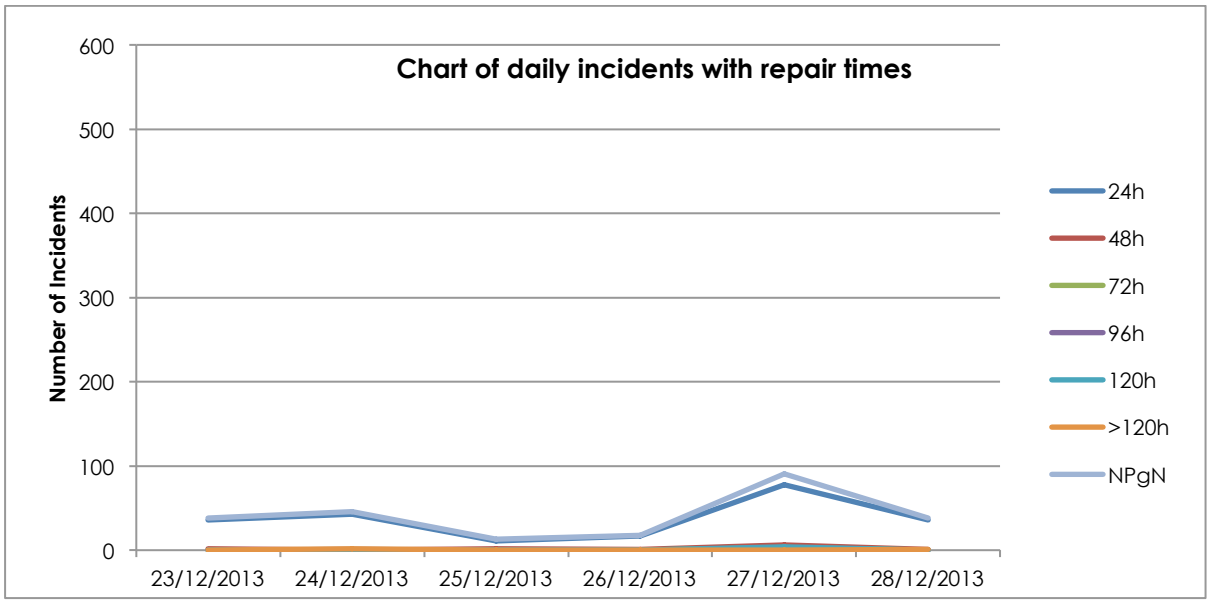
Number of short interruptions (< 3mins)	28,838
Number of incidents	242
Number of Customers losing supply (3mins and over)	48,937
Number restored within 1 hour	33,659 (69%)
Number restored within 24 hours	48,922 (99.7%)
Number restored within 48 hours	48,937 (100%)
Number without supply > 48 hours	0
Customer longest without supply	32 hours

NPgY was first impacted on 27 December with the event profile below:

Number of short interruptions (< 3mins)	26,721
Number of incidents	245
Number of Customers losing supply (3mins and over)	19,403
Number restored within 1 hour	14,185 (76.4%)
Number restored within 24 hours	19,403 (100%)
Number restored within 48 hours	19,403 (100%)
Number without supply > 48 hours	0
Customer longest without supply	22.4 hours

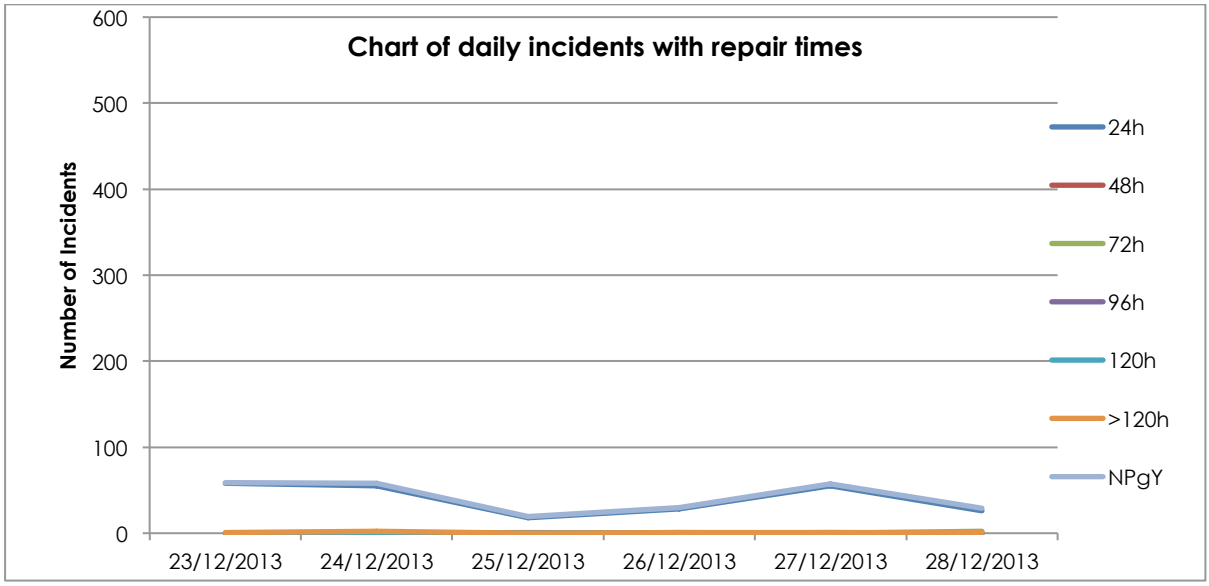
3.3 Incidents per day with repair periods by licensed area

NPgN



[3] Incident data based on Stage 1 data submitted to Ofgem, February 2014

NPgY



3.4 Customers interrupted (3mins and over) and restoration times

4 Planning and preparedness

4.1 In house plans and procedures

NPg has an impressive array of policy documents covering the preparation for and response to emergency situations. The core document is the Major Incident Management Plan (MIMP). The plan provides a generic framework and adds elements for particular types of events. Key roles and deputies are nominated and the plan provides for a three tier command structure for managing the response at a strategic, tactical and operational level. Comparing it to the commonly occurring models of governance in place for managing emergencies, the NPg approach is nearer to the formal command structure found in the emergency services.

Following every event there is a debrief, structured to reflect the nature of the event. The 5/6 December event of 2013 was reviewed with key participants on 8

January 2014. There is an annual major incident review event[4], the most recent being on 6 February 2014 which was attended by DECC. In its response, NPg catalogues a list of learning points which are being followed through in the coming months.

For the Christmas period, arrangements to guarantee resilience were initiated on 10 December, a 'pack' prepared and published on 20 December. This involved what has become standard practice, including populating MIMP roles with additional reserves, augmenting standby, checking general availability and exercising options over holiday granted conditionally etc. Following the warning on the 18 December, NPg secured 67% availability of directly employed staff, compared to the normal target of 50% over the festive period.

NPg takes the view that quick and effective response to weather events has value not only in terms of meeting restoration targets and minimising Guaranteed Standard (GS) payments to customers but also over time in improving broader stakeholder perceptions, such as the Ofgem broad measure of customer satisfaction[5].

In terms of resourcing operational staff, NPg makes extensive use of contractors when compared to most other DNOs. For overhead line staff, there is a broad equivalence in numbers between direct staff and contractors, with the company reporting 186 directly employed staff compared to 191 contractors. Reflecting on the comment in the DECC review to the effect that the use of contractors might present an issue in terms of access (some overlapping between DNOs) and immediacy of mobilisation, NPg points to the fact that contract staff are fully integrated into NPg's operational processes and systems, participating in standby rotas and general availability regimes. Their contract terms ensure firm availability.

Information about contractors' staff, such as skills, competencies, accreditations, contact details and availability can be accessed by NPg. The company has, by virtue of the commercial arrangements, 'first call' on its contractors during weather-related events. The company estimates that 75% of contractors' staff live within NPg's area. In NPg's view, the overall commercial and other advantages of its current contractor/direct staff mix more than outweighs any marginal benefits which might theoretically accrue to having a greater proportion of direct, locally resourced labour during severe weather events.

Changes to the organisational structure are currently in progress, involving a shift from five to nine managed units which reflect network and customer characteristics as well as basic geography, and an associated greater emphasis on localism. One of the specific actions to be taken forward during 2014 includes 'changes to the company's operational 'business as usual' structure to take advantage of greater localisation of operations', part of which involves a move to nine managed units. For the longer term, NPg is recruiting and training field staff and engineers, utilising the available workforce renewal incentive.

[4] This is cited as an exemplar of how to learn from previous events in the DECC review. See section 7.1.

[5] See 'Electricity Distribution Broad Measure of Customer Service - Customer Satisfaction Survey Results 2012 -13' in which the two licensees' performance may be described as 'variable'; good on some measures less on others. The detail is available at www.ofgem.gov.uk/ofgem-publications/84659/cssoverview1213.pdf

4.2 Weather forecasting

NPg was not significantly affected by the Christmas 2013 storm. The severe weather of 23 to 28 December did not require escalation beyond a yellow alert, which was issued on 18 December[6].

There were however, major events over the winter, most notably on 5 December 2013, when gale force winds crossed the whole of NPg's area moving from north to south. The strong winds also drove a storm surge for the evening high tide, leading to coastal flooding along eastern parts of the region. In excess of 127,000 customers were affected by 402 separate faults, many with multiple and extensive points of damage, of which 218 were on the HV network. This event was significant enough to cause both NPgN and NPgY to exceed the GS11b thresholds of 59 and 60 event-related HV incidents in a 24 hour period respectively.

NPg uses the Met Office forecasting and alert service. Whilst NPg's service is bespoke; it includes most services typically taken up by DNOs. These include a forecast comprised of a five-grade severity rating system with a geographic spread across all operating zones; 24/7 365 day lightning risk warning alert service; and 24/7 365 day access to a duty weather forecaster in the event of questions. NPg receives all public severe weather warnings as a category 2 responder and has access to the Met Office Hazard Manager website for emergency responders. NPg also receives the five day flood guidance statement from the flood guidance centre and the environment agency-issued flood warnings for the whole of its company footprint.

For NPg, the most significant event occurred during the period 5 to 7 December. The forecast resulted in a yellow alert being called at 14.03 hours on 3 December; an amber alert at 11.30 on 4 December and a red alert at the 11.00 meeting on 5 December as numbers of faults began to escalate.

> 'The event was well forecast with weather and flood warnings issued but the intensity of the event was not clearly understood with a maximum of 65mph indicated in the Met Office contracted forecast and a surge high tide 0.5m higher than expected, the worst in 50 years'.

The lower key event for NPg over the Christmas week (the 23 to 28 December poor weather episode) was also forecast; again with a sufficient degree of accuracy to ensure escalation to the appropriate level at the appropriate time.

NPg has put effort into understanding the correlation between predicted weather and the likely onset, scale and nature of network damage. The company believes there is scope to improve the accuracy of its current forecasting model which relates weather events to network performance. As a management tool this could aid, among other things, resource planning and allocation, and improve initial estimated time of restoration (ETR) information and messaging.

However there is also a degree of realism about what can be achieved, as it was put to us during our visit:

> "… each specific major event has its own, unique set of circumstances … weather pattern, timing, scale and type of damage, geographic coverage … impact on the overall infrastructure … and other pressure the network is under…"

[6] Essentially this is the first level in NPg's Major Incident Management Plan, involving notifications; checking shift and retained rotas; availability of additional operational and customer service staff; availability of stores, specialist vehicles; maximising network security etc.

Thorough planning, preparation and forecasting must therefore be overlaid with the application of operational and management expertise in handling severe weather events. NPg's team members confirm they have the strength in depth to provide this and have succession arrangements into the future.

At the time of the visit, NPg was in the process of agreeing a revised forecasting service with the Met Office.

5 Response and restoration

5.1 Impact

The 5 to 7 December 2013 event was NPg's largest wind-related severe-weather event for over ten years.

For the 23 to 28 December 2013 - the focus of this study – NPg experienced stormy weather with high winds, rainfall and lightning, the bad weather was not on the same scale as that experienced across the south of the country.

5.2 Restoration strategy

The framework for this is provided by the Major Incident Management Plan (MIMP). The priority of a fault repair is managed within both the local and area management centres (LMC and AMC) with a strategy set by the Strategic Management Centre (SMC).

The Outage Management System (OMS) does not incorporate a process for the automatic prioritisation of incidents. However, it includes a process for ensuring any reported safety incident is given a high priority status and it orders the incidents visible on screen with HV faults being the first visible and non-network incidents being the lowest visible incidents.

All fault details and durations are captured within the OMS for post-incident analysis for QoS/IIS, guaranteed standards and network performance purposes.

Managers and local staff have access to 'OMSView' reports which have been designed to ensure those who need to know can see fault volumes by area, category etc. All those engaged in the restoration process from end to end have access to this up to date information.

> "The information provided by all communication channels is from the same source, our OMS system".

Guided by the MIMP, NPg adopts what has become accepted good practice when making tactical decisions on allocating resources for restoration; risk assessments for field staff working in inclement weather conditions e.g. not working at height during windy conditions (objectively assessed used wind speed meters) and deployment according to estimates of event duration e.g. working into the deep night if the event can be cleared that day, otherwise standing down until first light, using the time to prepare work packages for the following morning. To quote

> "One thing remains constant, however, and that is we will not take uncontrolled risks in pursuit of an earlier completion of the restoration activity. The resourcing strategy and restoration profile is closely managed and is a main part of the strategic call agenda when an event is in progress".

5.3 Effectiveness

The charts profiling the impact and response to the Christmas storms are included for completeness but, as has been explained, the statistical profile does not provide a representation of how NPg might perform under very severe weather conditions.

During the winter NPg was an active participant in NEWSAC, not only in terms of the 'calls', but also in mobilising staff to work elsewhere. The company exported staff under NEWSAC during St Jude, over the Christmas period and in February 2014. NPg received support on 5 December from UKPN (22 overhead line staff and two engineers) and WPD (9 and 3 respectively). Full details of staff movements among companies under the auspices of NEWSAC are shown as an appendix to the main body of the report.

6 Keeping customers informed

6.1 Overview

Following a major power supply interruption all DNOs recognise the importance of keeping their customers informed on the progress of restoration and, with large numbers affected, this can only be achieved by the effective use of a telephony platform and associated systems, including extensive use of the internet and text messaging services combined with the skills and experience of staff to manage, operate and utilise the various available facilities.

All DNOs have implemented a telephony platform with call handling and messaging facilities; differing only in technical aspects and the level of unification between the various systems that deliver and present the required information. Applying computer telephony integration (CTI) technology, a total unification strategy would provide a complete network to desktop infrastructure, including comprehensive functionality at individual workstations.

In general, the technical aspects of each DNO's telephony platform is adequate and fit for purpose and, other than short-term technical faults, performance can be characterised by the quantity of calls answered within an acceptable time and the availability and quality of messages which satisfy customers' expectations.

The structure of the company both in terms of staff and CTI systems provides a quick and measured approach to dealing with an emergency event when it occurs. NPg's telephony platform has robust call-handling and messaging processes in place for keeping customers informed.

The review visit to NPg enabled meetings with NPg's staff at all levels directly involved during the Christmas emergency including customer-facing call advisors.

Assessment process

The review of NPg's telephony platform, the associated computer-based systems and communications networks was only conducted at a high-level.

The assessment focused upon NPg's effectiveness in keeping its customers informed with accurate and timely loss of supply information during the Christmas emergency period. The main areas reviewed covered the acquisition, accessibility and delivery aspects of the information to the company's customers through its telephony platform and other media.

6.2 Planning and preparedness

NPg's MIMP details the processes to be followed in response to forecasts of severe weather that has a likelihood of causing major disruption to the company's power networks. On average, NPg experiences two or three two-day events and one up to five-day event every three to five years; thus its systems routinely operate under stress.

Annual seminars are used as the means of ensuring staff are made aware of any changes that may have occurred in the preceding year. The seminar includes a test of an aspect of the MIMP.

The MIMP was fully implemented on 5 December in response to the impact of the strong winds and resulting tidal surge. Due to the forecasts of severe weather NPg remained at MIMP yellow alert from 18 to 28 December. The severe weather that occurred between 23 and 28 December did not require escalation to the next level of alert as preparations that had been put in place to cover the Christmas period were implemented to assist with the system incidents which occurred on 27 December.

6.3 Acquiring information

Early indications of the potential damage caused by the winds are alerts from the network control centre systems, which continuously monitor the higher voltage networks. Indications of loss of supplies are passed from the control centre systems[7] via the fault management system to the interactive voice response (IVR) facility. The IVR and website then makes available a geographically tailored message for incoming customer calls. At all voltages, customers' loss of supply calls are registered automatically by IVR or manually by call advisors into NPg's fault management system, thereby providing additional information to dispatchers and control engineers who may not be aware of a particular fault. The IVR provides dynamic messaging using the most up to date information from OMS. The facility also exists to add a bespoke message where appropriate to provide greater detail to customers. The same information is available to the contact centre call advisors who can inform those affected customers who elect to speak to an advisor.

The telephony platform facility for automatically linking customers' telephone numbers[8] with the fault management system is a very effective way of making fault information available and reducing the volume of queued calls waiting to be answered.

Key information comes from the field teams working on repairs, by telephone, with information to update the fault management system; location, nature, impact on public safety and restoration progress updates. Again, this information becomes available to all staff with access to the company's fault management system.

IVR and SMS messages are updated after relevant information has been validated. Messages may have standard content or, for an HV fault, a bespoke recording giving more specific details relating to the fault, its impact and area affected.

NPg reported there were no issues with the communication systems between field staff and control centre or dispatch during the storm period. However, in the initial stages of a widespread system emergency, the quantity of calls has the potential to become a bottleneck due to the disparity of staff numbers between field and control centre. It is recognised that, in the first hour of an emergency, with the

[7] ENMAC™ / PowerOnFusion™
[8] If registered

technology now available, a control engineer may be more effective in restoring customer supplies by using remote controlled tele-switching than in dealing with more localised operations carried-out in the field.

6.4 Communicating the information

Incident information available to customers is taken direct from the fault management system ensuring that it is as consistent, accurate and as up-to-date as is achievable.

NPg communicates with customers through the customers' channel of choice; inbound telephony with options for speech contact; IVR speech; SMS messaging; proactive outbound calls; website; Facebook and Twitter. It is putting effort into developing its website, such that it becomes regarded as a reliable, accessible, easy to use and up-to-date source of information.

NPg's CTI platform automatically links customers' telephone numbers[9] with incident information enabling the call advisors to view the information when the customer's call is answered and then transfer it to the OMS. This makes the information available and reduces the talk-time (duration) of the call.

6.5 Systems and their resilience

NPg's CTI platform and communication networks enable company-wide access to authorised staff to process or view the fault information, including those working from home, if required.

Local interconnectivity is provided by duplicated local area networks. Connections to remote key locations and offices are provided by a private wide area network, using secure and diverse connections within BTs' high capacity, high-speed digital communications network.

The call-handling and messaging systems have the capacity to handle large volumes of telephone traffic and to deliver messages via IVR or SMS very effectively with the option to access the BT Mass Messaging system if necessary.

Third-party service providers were informed in advance of the pending event and all planned IT work was suspended. No issues affecting NPG's CTI systems and associated communications networks were experienced during the Christmas period.

6.6 Resourcing

The NPg contact centre located at Penshaw handles all customer calls from the company's two licensed areas, with a contingency contact centre at Shiremoor. At each location, including a number of operational depots, non-contact centre staff are available as trained call advisors to be used in overflow situations.

NPg's 78 call advisors (including 13 supervisors) are based at its Penshaw contact centre, with the company's overflow facility adding over 100 additional trained staff. These numbers, combined with the diversity of locations, provide a flexible way to increase the number of call advisors for customer call handling during a system emergency. The working from home option which NPg is pursuing offers the potential to add further resilience.

[9] If registered

6.7 CTI platform effectiveness

The review has shown that NPg's CTI systems and communication networks provide a secure and flexible platform for supporting its contact centres and its overflow facilities. The call-handling and messaging systems have the capacity to handle large volumes of telephone traffic.

No issues affecting the operation of internal or service providers' CTI systems and communications networks were experienced during the Christmas period.

Call advisor staffing effectiveness

To assess of the adequacy of the advisor staffing the following measures were considered:

- The abandonment rate;
- Wait-time; the mean time taken for response by an advisor; and
- The number of advisors answering calls.

Answering customer calls.

Answering all customers' calls by call advisors within an acceptable wait-time depends upon matching the number of advisors to the call volume, which is highly volatile, with significant and sudden peaks especially at the start of a system emergency. In the situation of the volume of incoming calls exceeding the number of free advisors calls will be queued and there will be a wait-time before the call is answered. The availability of an advisor becoming free is dependent on the duration of the call and any associated process work, such as updating the company's incident database.

The customer has the option to abandon the call at any time while waiting; the longer the wait the more likely the call will be abandoned. Based on an acceptable wait-time[10] the abandonment rate (AR) is often used as a service measure, the target being appropriate to the service offered. In the case of emergency lines a very low abandonment rate must be targeted.

The abandonment rate is the ratio of the number of abandoned calls to the total number of queued calls. The abandonment rate is not just dependent upon answer time; type of call, time of day, caller tolerance, and availability of alternatives may all be factors.

[10] Variable under the control of the Contact Centre

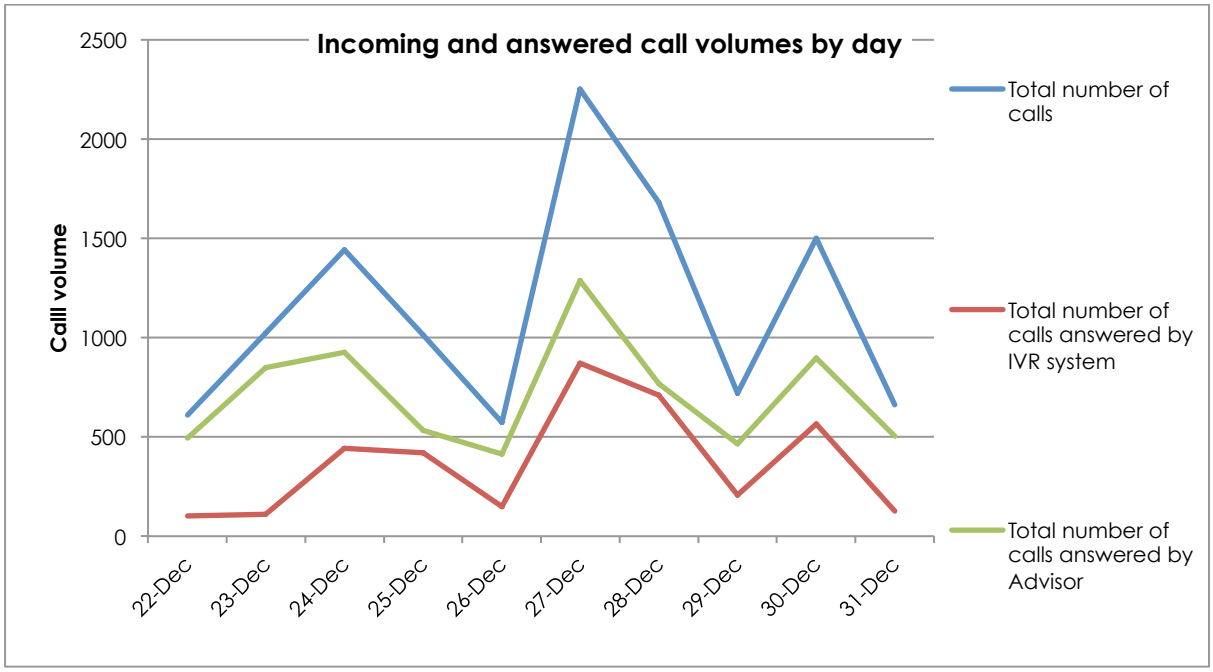


Chart 1 – Association between incoming and answered calls NPgN & NPgY

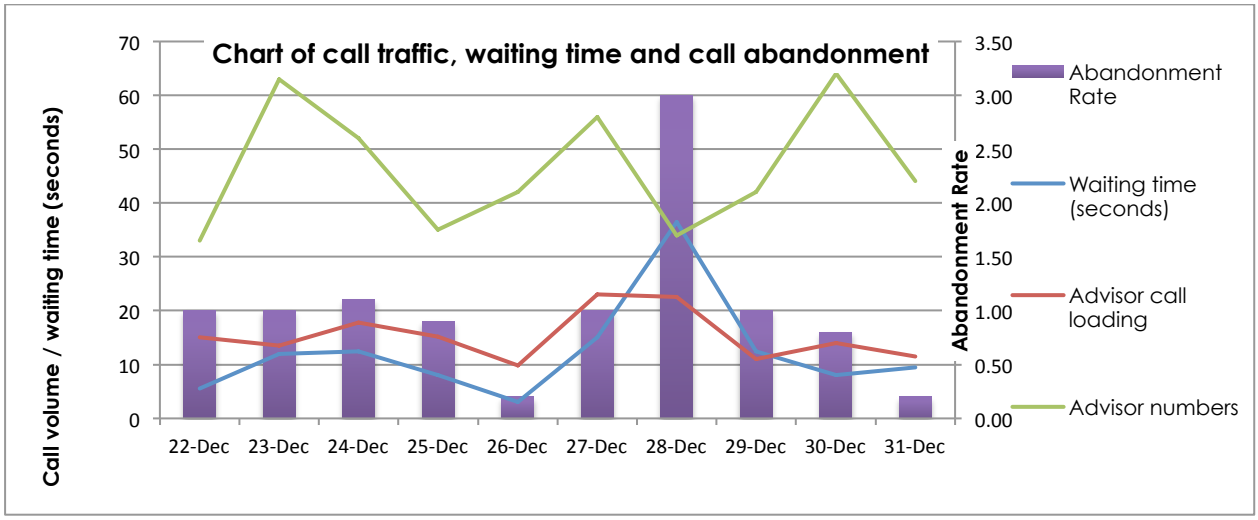


Chart 2 – Association of factors to abandoned calls – NPgN & NPgY

KM1	2259		KM2/KM1	38.60%
KM2	872		KM3/KM1	57.06%
KM3	1289		KM5/KM1	1.11%
KM5	25		Total	96.77%

Table 1 – Peak total call volumes - 27 December 2013

Observations

NPg operates a single contact centre with a separate overflow facility served from a central pool of call advisors who, during BAU, will respond to customers' from one of the two licensed areas with the facility to ramp-up the number of call advisors during periods of high call volume. The charts and table show the outcome from the combined KMs for both licensed areas.

From Table 1, 39% of calls were answered by the IVR and 57% answered by advisors. The unsuccessful call rate for the day (27 December 2013) was 1.1%.

Combining the KMs; chart 1 shows the three peaks which occurred due to events in both licensed areas on 24, 27, and 30 December 2013. Chart 1 illustrates how both the IVR and advisor profiles closely follow that of the call volume. Chart 2 shows the management of the waiting time and hence the abandonment rate kept below 9% until 28 and 29 December when it rose to 16% but with a maximum waiting time of only 40 seconds.

7 Internal review, evaluation and follow up

7.1 In-house reviews

The full MIMP is reviewed every three years, the last full review being in 2012. It is also reviewed after each full event activation; any significant organisational change within the company; or external requirements such as legislation, Governmental or regulatory changes. The company therefore conducted a review of the event after the storm of 5 December 2013. Although one of the least affected DNOs during the Christmas storms – and not required to attend the Energy and Climate Change Select Committee hearing on 21 January – NPg submitted data to both the Ofgem stage 1 and DECC reviews, together with a follow-up report on 1 May 2014 to Ofgem.

7.2 Network condition and resilience

Technical standards are set out in the company's Long Term Development Statement for each licensed area.

NPg's networks are designed to ENA standards and, like others, it has legacy networks inherited from the two diverse area electricity boards/licensed areas that comprise the current DNO. The company conducted a detailed and thorough review of network resilience and condition after the storm of 5 December 2013. Summarised in a presentation pack, this comprises the continuation and augmentation of existing programmes including the selected refurbishment (based on condition data and construction type) the replacement of small section conductor in the north east, enhanced pole foundations, the use of aerial bundled conductor (ABC) for low voltage overhead line replacement and the selected use of XLPE-covered high voltage conductors in locations where high tree densities occur.

The programme of remote controlled tele-operation; a significant factor in the early restoration of large numbers of customers; will be continued where economically justified, along with the implementation of centralised network management system based automation.

7.3 Learning from others

Along with other DNOs, the company is participating in delivering the DECC action plan and taking forward actions.

NPg has initiated a data-flow change request, on behalf of all DNOs, to Gemserv to enable the release of customer contact details for use during disruptive events. This will ensure DNOs have (where they are available) the telephone contact details and email addresses of customers from energy suppliers. This should facilitate the improvement of the flow of information to customers – through a number of channels, including for example messaging related to CLI and targeted call backs[11].

Issues to be taken forward during 2014 include a greater formalisation of non-operational support within the MIMP; enhancements of the MIMP flood module to cater for the specific response issues associated with a tidal surge; and opportunities for improvements which may be gained from understanding industry best practice. The DECC review will be helpful in this regard.

8 Review of performance against success factors

As can be seen from the data tables, the severe weather during 23 to 28 December did not have a major impact on NPg's two licensed areas. In the terms of the company's internal emergency management procedure the event did not require an escalation beyond a yellow alert – its first level of preparedness / response.

NPg was however, significantly affected by the 5 and 6 December 2013 severe weather and much of the commentary below (e.g. SF 4 to 9) relates to evidence provided by the company on how this event was managed.

Ref	Activity	Review of NPg's performance
SF1	Emergency plans and advance preparation	❑ NPg has in place well written and formalised plans. ❑ The Major Incident Management Plan (MIMP) is the key framework document. This plan provides a generic framework and adds elements for particular types of events. Key roles and deputies are nominated and the plan provides for a three tier command structure for managing the response at a strategic, tactical and operational level. ❑ Comparing it to the commonly occurring models of governance in place for managing emergencies, the NPg approach is nearer to the formal command structure found in the emergency services. ❑ The plans may not have been tested during the Christmas event – but were on 5/6 December 2013 and were assessed as effective. This early December event has prompted a range of improvements to preparedness and resilience of system critical to the successful management of severe weather events.
SF2	Weather forecasts, prediction of	❑ NPg uses the Met Office for its forecasting requirements. ❑ Forecasts were sufficiently accurate to inform the

[11] DECC review, see action C7 which stated that NPg were 'required to submit a data flow change request to Gemserv on behalf of the other Network Operators to initiate the release of customer contact details for use during disruptive events. Network Operators shall ensure that, in advance of winter in October 2014, they have, where available, obtained the telephone contact details of customers from energy suppliers'.

Ref	Activity	Review of NPg's performance
	impact and resource requirements	necessary actions under MIMP. ❑ A yellow alert was issued on 18 December which proved appropriate to the circumstances. The objective is for a yellow alert to be issued 24 hours in advance of bad weather – and it was so in this occasion.
SF3	Early reaction and mobilisation	❑ A resilience pack was prepared, agreed and published in advance of the festive holiday. ❑ The yellow alert prompted a review and confirmation of rotas, availability of contractors, logistical support etc.
SF4	System automation to restore bulk customer numbers	❑ NPg has invested in system automation and remote switching capability, the benefit of this was shown over the winter. For the 5/6 December major event 52% of customers in the Northeast licensed area were restored in less than an hour, and 41% in the Yorkshire licensed area.
SF5	Telephone response & answering service.	❑ For the Christmas week, a resilience pack had been published. ❑ There are 78 contact centre staff (on shift, providing full 7 day cover) with over 100 overflow staff available. The maximum number available was 63 on 23 December. NPg is trialling an extension of its call-taking system to enable call-taking staff to operate from home. This will be operational during 2014. SMS messaging is used extensively. ❑ The evidence suggests that NPg's call management systems were not stressed during Christmas week event. ❑ For 5/6 December 2013 the capacity of inbound lines for reporting power cuts was not exceeded. For a 9-hour period on 5 December not all customers could be transferred to a advisor from IVR; these were given a message. On the same day, some customers received a busy tone on option 1 (reporting an emergency situation) as customers used this in an attempt to find out information regarding no-supply situations. ❑ The company has initiated a range of system upgrades.
SF6	Gathering field information	❑ NPg supports and supplements information received from its incoming telephone calls with scouts as a means of gathering more informed information regarding network damage, team size and materials required to carry out repair and number of customers expected to be restored by the repair. ❑ In December, field to control communications was

Ref	Activity	Review of NPg's performance
		by telephone. The use of hand-held devices (which enable OMS access and data reporting) is currently being implemented to mitigate one of the conventional bottlenecks in the restoration process - field/control operational communication.
SF7	Processing Information	❑ In common with most DNOs NPg has invested heavily in technology to support the processing of information from its networks, from customers and from staff to provide an overall picture of the damage to its networks, the likely work required to carry out repairs and estimate restoration times. The volume of information to be processed is massive. NPg, along with all DNOs, is significantly better placed to handle this than it was 10 years ago
SF8	Rapid dispatch of switching resource to site	❑ NPg has rapid response teams authorised to carry-out high voltage switching to the instructions of the system control engineer and is able to dispatch resources quickly and efficiently to switching points on the network to deliver maximum benefit to customer supply restoration. ❑ Staff have access to GIS technology and navigational aids.
SF9	Ensure adequate resources in terms of people, transport materials	❑ The MIMP documents thoroughly NPg's arrangements for checking the availability of emergency supplies and specialist plant and equipment. ❑ There was no suggestion that the company approached capacity of any resource during the Christmas event. See SF12.
SF10	Adequate overhead line staff	❑ NPg holds two distribution network licences both of which have overhead line networks, amounting to approximately 10% of the country's overhead lines. ❑ NPg has a relatively low ratio of linesmen to km of overhead line, with 75km of overhead line per member of overhead line staff. ❑ NPg operates a mixed in-house / contractor policy for overhead line staff, employs 6% of the country's directly-employed line staff and 16% of the country's contract staff, amounting to some 8.5% of the country's total overhead line resource. ❑ Into the future, NPg is likely to be exposed to the risk of both distribution networks being severely affected simultaneously by adverse weather, and the consequent reliance on obtaining access to additional contractors or using staff mobilised through NEWSAC to sustain a response in the event of a prolonged emergency. The company has risk-assessed this scenario.
SF11	Management of repairs	❑ NPg's restoration strategy is event-specific and set by its Strategic Management Centre (SMC). However,

Ref	Activity	Review of NPg's performance
		like all DNOs, the company will generally prioritise repairs to achieve maximum numbers of customers restored to supply in the shortest possible time, after the restoration that can be achieved by switching is complete. ❑ Management of the 5/6 December incident showed the importance of this flexibility where resources were diverted to inspecting operational sites at risk of flood damage. ❑ This generally takes the order of highest voltage faults impacting supplies first, working down through voltage levels, followed by restoration of strategic duplicate circuits that have faulted and impose a system risk but are currently not affecting customers' supplies.
SF12	Manage the event tail	❑ This did not apply to NPg during the Christmas week. All customers were restored within 32 hours. ❑ The company was able to export staff to support others (UKPN on the 26 December – 17 staff and ENWL on 28 December – 13 staff) during the later stages of this event.
SF13	Mobile Generation	❑ NPg has framework agreements with five providers; equipment is bonded to the company. This ensures good geographic coverage. ❑ Generator deployment (along with other specialist plant and equipment) is checked at yellow alert; at amber there is active liaison with providers. Capacity has only been approached on one occasion - during the 5/6 December event.
SF14	Use of all media channels to communicate with customers	❑ All mainstream channels were used. In addition to call handling, there were media briefings and the use of social media, (Facebook and Twitter), links via YouTube to advice on what to do in the event of a power cut and the Red Cross. ❑ NPg's website has a power cut checker. It has a facility for customers to check the status of power cuts by post code, provide ETRs and access emergency numbers. Traffic suggests this, with the associated app, is becoming increasingly popular among customers as a source of information. NPg enhanced its website usage capacity after the 5/6 December event and is continuing to invest in development of this facility to enhance traffic capacity further and extend ease of use (e.g. reporting incidents on line). ❑ Training in the use of social media as part of crisis management is being rolled out to non-expert users during 2014.

Ref	Activity	Review of NPg's performance
SF15	Provide realistic estimates of repair duration and informing customers	❑ All DNOs recognise the need to give the most accurate estimates of restoration times that they can. Over-optimistic repair times tend to antagonise customers, particularly when not updated and restoration times are not achieved. Equally, unduly pessimistic times are not helpful to customers as there are likely to be instances of customers making alternative arrangements only to find the supply is restored soon after leaving home or incurring expense. ❑ Customers are frequently surprised that, after waiting for several hours for information about their predicted restoration and the DNO not having an answer, that the repairs are ultimately carried out in a matter of minutes from arrival on site. This is the reality of some types of incident. Under the terms of the DECC initiative NPg is sharing ideas on managing the process of making available realistic ETRs.
SF16	Provide feedback to customers with regular updates	❑ Through the OMS and telephony, along with feedback from staff in the field, NPg provides messages to customers through the range of media – from messaging, the work of the contact centre and the use of new media. Information is routinely updated.
SF17	Local presence and community contacts	❑ The company has five NPg customer service vans and these were all deployed for the 5/6 December event. NPg has partnership arrangements with the Red Cross; again these were activated for the 5/6 December event.
S18	Provide adequate welfare facilities to PSR customers from start of event and to all customers who are without supply for more than 48 hours	❑ NPg has dedicated team members in the contact centre to deal with PSR customers. 218 proactive calls were made to 170 vulnerable customers. The arrangement with the Red Cross was activated. ❑ In accordance with NPg's general approach, a lessons learned review, coupled with sharing best practice via the DECC review, has led to some minor but potentially useful improvements.

Appendix 3 Scottish Power Energy Networks (SPEN)

1 Summary

SPEN experienced a very busy December, with the 5/6 December 2013 event and associated west coast flooding being the more significant event and more testing than the Christmas period.

SPEN's Christmas severe weather event hit on 26 December, reaching its peak of activity on 27 December resulting in 913 network incidents, interrupting electricity supplies to 72,664 customers on its two networks. Restoration was complete within 48.5 hours in Scotland and 65 hours in SPManweb's area.

SPEN uses the STORM® telephony system, which is focused on its two call centres; at Kirkintilloch and Prenton; and is available to staff across the company. The system coped with the increased traffic associated with the Christmas event, though demand was not at the level experienced by those companies with licensed areas in the south, which suffered the most severe weather. The automatic messaging system appears to have satisfied customers. SPEN was able to increase its call centre staff levels adequately to cope with the increase in demand.

SPEN operates 14% of the country's overhead line networks and in total employs 13% of the country's skilled overhead line strength, with a significant dependence on contractors, which make up more than half of its overhead line workforce. As a result of the number of severe weather event experienced in recent years SPEN has generally been a net importer of staff under NEWSAC but, during the December 2013 event, the reverse situation was the case. In December SPEN was unable to receive any support at the time it was needed due to severe weather events elsewhere.

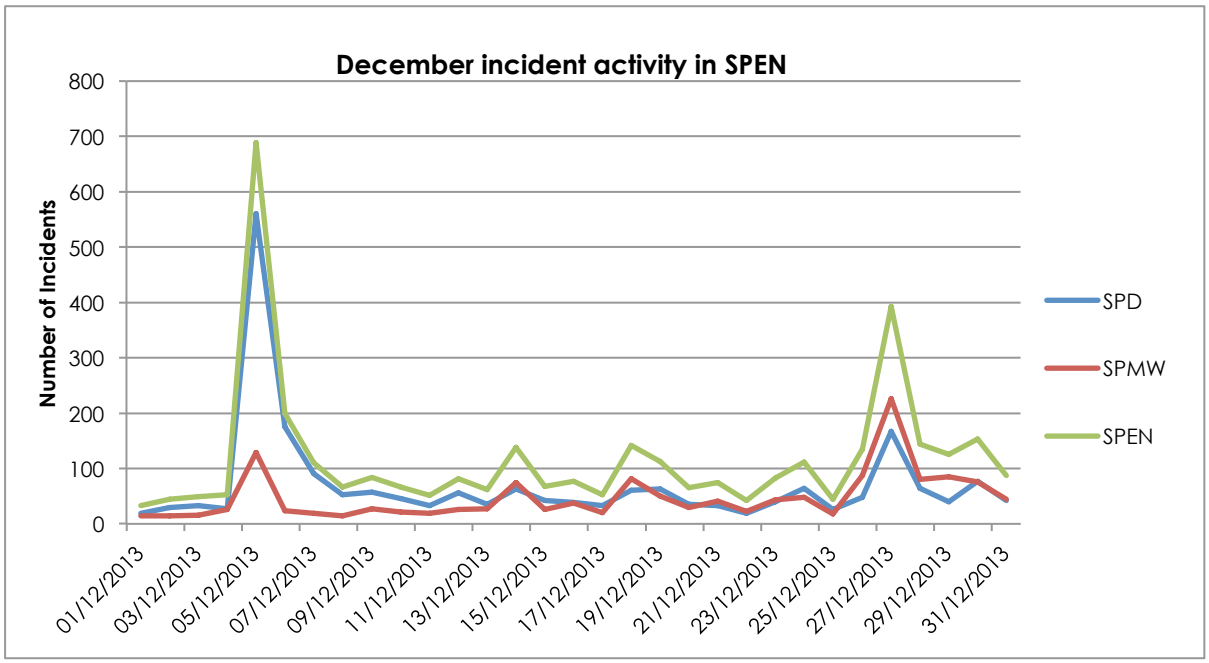
2 The company

SPEN is the electricity DNO covering Merseyside, Cheshire, North Wales, North Shropshire, Central and Southern Scotland, delivering electricity to over 3.5 million customers over a 34,000 km^2 service area.

SPEN owns two distribution licensed areas: Scottish Power Distribution (SPD) and Scottish Power Manweb (SPMW). The aggregate network consists of 39,000 km of overhead lines. SPEN's two licensed areas have non-contiguous boundaries and are separated by the licence area operated by ENWL in the north west of England.

3 The event

3.1 December incident activity in SPEN



3.2 Scale of the Christmas event in SPEN

SPD was first impacted on 27 December with the event profile below:

Number of short Interruptions (< 3mins)	26,651
Number of incidents	411
Number of Customers losing supply (3mins and over)	24,469
Number restored within 1 hour	8,572 (35%)
Number restored within 24 hours	23,964 (98%)
Number restored within 48 hours	24,450 (99.9%+)
Number without supply > 48 hours	19
Customer longest without supply	48.5 hours

SPMW was first impacted on 26 December with the event profile below:

Number of short Interruptions (< 3mins)	110,980
Number of incidents	502
Number of Customers losing supply (3mins and over)	48,195
Number restored within 1 hour	26,571 (55%)
Number restored within 24 hours	46,724 (97%)
Number restored within 48 hours	48,116 (99.8%)
Number without supply > 48 hours	79
Customer longest without supply	65 hours

3.3 Incidents per day with repair periods by licensed area

SPD

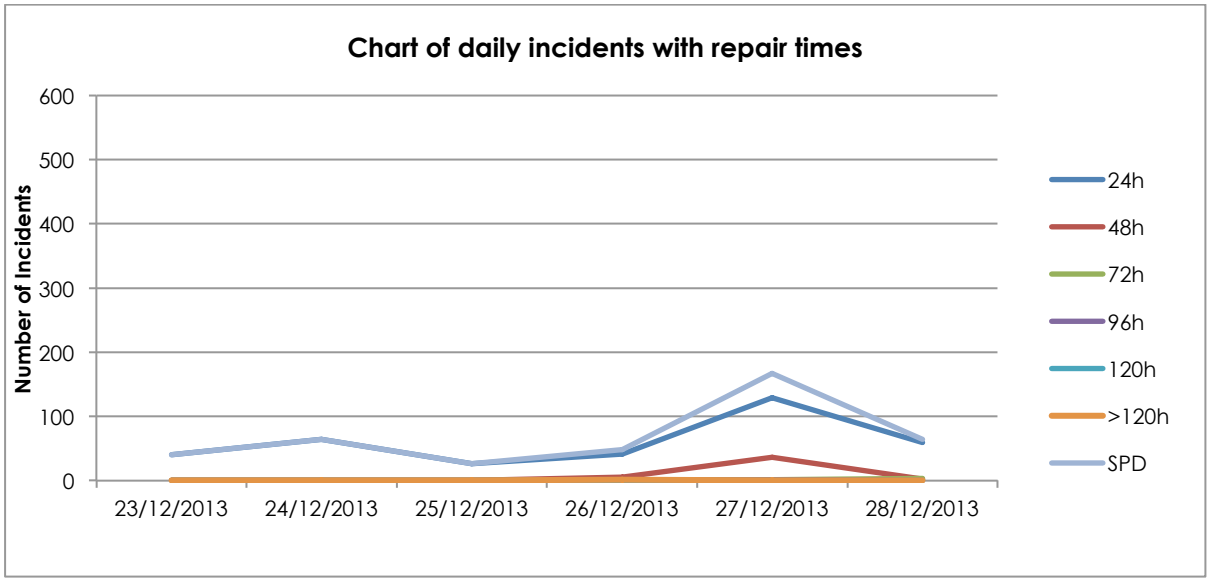


Chart of daily incidents with repair times
Number of Incidents
600
500
400
300
200
100
0
23/12/2013
24/12/2013
25/12/2013
26/12/2013
27/12/2013
28/12/2013
24h
48h
72h
96h
120h
>120h
SPD

SPM

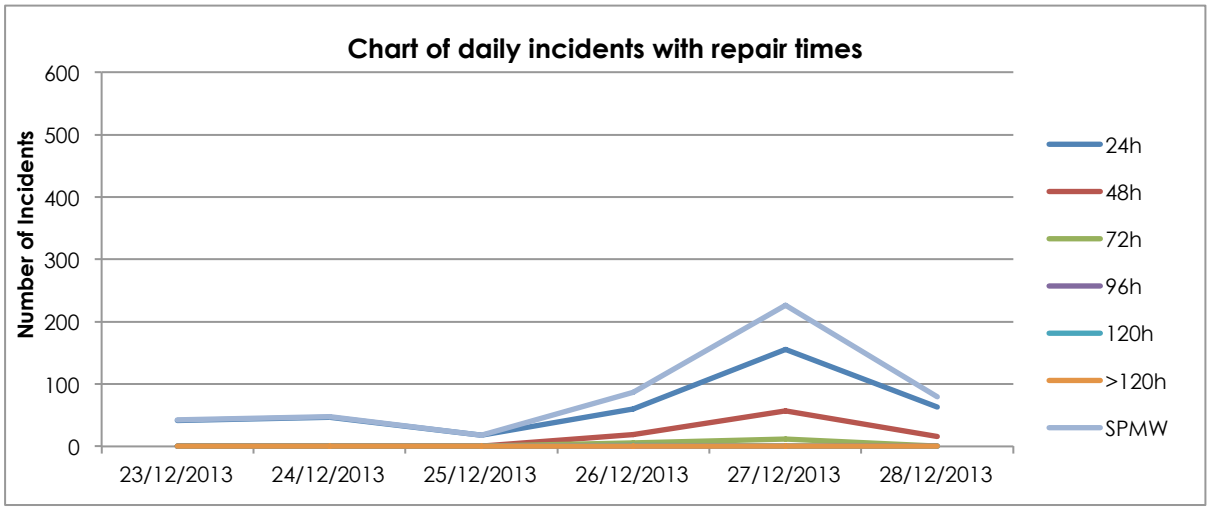
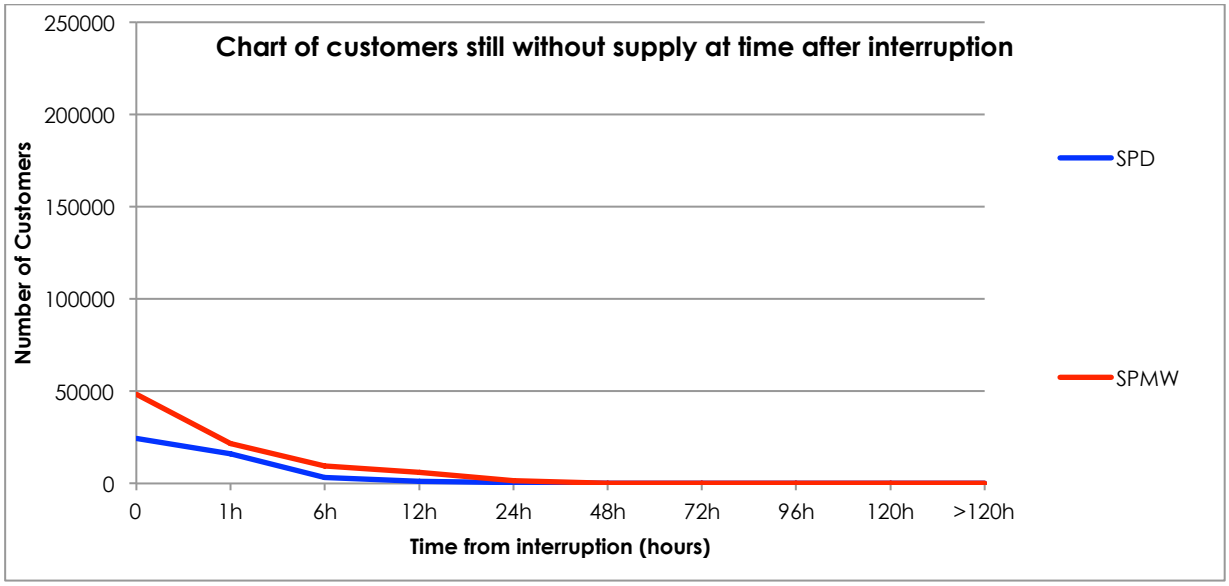


Chart of daily incidents with repair times
Number of Incidents
600
500
400
300
200
100
0
23/12/2013
24/12/2013
25/12/2013
26/12/2013
27/12/2013
28/12/2013
24h
48h
72h
96h
120h
>120h
SPMW

3.4 Customers interrupted (3mins and over) and restoration times



4 Planning and preparedness

4.1 In house plans and procedures

SPEN has emergency plans, processes and procedures in place identifying the level of emergency, responsibility and contact details of key individuals when dealing with system events, in particular for response to a weather-related system event. These plans are regularly reviewed at the end of each winter period and modifications made as required. Examples were given that the 'Planning for Emergencies Volume I Company Overview' was updated on 10 April 2014 (previous updated April 2013). In addition, the following documents were updated as shown – Emergency Networks Black Start Plan revised on 10 April 2014 (previously updated April 2013) and OCC Emergency Action Plan updated 21 January 2014 (previously updated Nov 2010).

Emergency Plans are in place in each of the SPEN geographical Zones, 6 in SPD and 6 in SPMW, (Document PLAN 1 System Faults and Emergencies) and are all reviewed locally on an annual basis.

Within the SPEN Plan, the levels of Emergency are defined as Level 3, Level 2 and Level 1 depending upon the anticipated severity of the emergency. Level 3 emergency is a warning that an abnormal situation may develop or exists, which is likely to require more than routine procedures.

A Level 2 emergency is declared when a significant number of customers have lost supply or a significant unplanned transmission event has occurred where supplies are expected to be restored within 24 hours. If one of the Network areas (SPD or SPMW) is on a Level 2 emergency, the other Network Area will consider declaring a Level 3 emergency to provide operational support. When SPD or SPMW declares a Level 1 emergency then the other area uses the declaration as a trigger to provide support and declares a Level 3 emergency.

A Level 1 emergency is declared when significant numbers of customers have lost supply or a significant unplanned transmission event has occurred and restoration of all supplies is expected to exceed 24 hours.

SPEN also uses the forecast wind speed as an indicator of the severity of the likely system event. With wind speeds predicted to be below 60mph normal standby arrangements apply although resources would be doubled-up over a Bank Holiday period. With wind speeds predicted between 60 – 80 mph (Amber warning) the resource availability would be increased by a factor of two. If it were forecast that wind might be accompanied by ice build up, then the resource availability would be increased further. With forecast wind speeds greater than 80 mph (Red warning) this is classified as a severe weather warning.

SPEN declares a Level 3 emergency for all Amber and Red weather warnings and potentially for wind speeds marginal for an Amber warning

During any emergency a decision is made whether to suspend or cancel planned work – depending upon the severity of the forecast.

The Operational Control Centre (OCC) in Kirkintilloch manages LV and HV/EHV control for the SPD licensed area on a day to day basis. There is a further Network Management Centre (NMC) Control Room located at Prenton which, in addition to the LV, HV and EHV voltage levels, also manages the 132kV system for the SPMW area

SPEN regularly experiences several level 2 or level 1 emergency events annually so it does not routinely carry out 'rehearsals'. However, rehearsals and stress tests are scheduled in the autumn months if no events occur during the year. SPEN always carries out a review after each emergency event and acts on any learning points arising from a local review or a formal Panel of Inquiry depending on the severity of the event. Emergency plans are updated accordingly.

In autumn, in preparation for the anticipated increase in network activity over the winter period, SPEN carries out a review regarding what additional resources and equipment it will require to cater for the reasonably anticipated system events over the winter period. Additional four wheel drive vehicles (50) were secured for the 2013/2014 winter period and helicopter availability was also secured. In addition, an enhanced level of staff availability was established, in particular, over the Christmas and New Year period. It is normal practice for SPEN to allow up to half of its workforce to take holiday over the Christmas period.

In addition, for network security, SPEN required that its network was restored to 'normal' by 22 December and no planned outages were allowed between 23 December and the New Year.

On 16 December, with the forecast of high winds, a further review took place into what likely additional resources would be required including the availability of contractors over the Christmas period. In addition, an internal memorandum was issued on 17 December asking all staff to 'play their part' should there be extensive damage to the network. In anticipation of the storms the first national NEWSAC call was made on 23 December and these continued throughout the period. However, due to the widespread nature of the event no resources were released from, or to, SPEN via NEWSAC.

During the Christmas period the predicted wind affected the SPEN region in the early evening of Boxing Day. No repair work could be commenced until the winds subsided due to the danger of working at height with associated windborne debris. Wind speeds of 109mph were recorded (against a forecast wind speed of 90 mph)

and in SPEN winds exceeded 60mph for an 18-hour period. This caused delays in starting the repair work and thus affected the final restoration times. In addition, many roads had been closed due to either the wind itself or were blocked by fallen trees.

During emergencies HO EAC (Ochil House, Blantyre) adopts the strategic role in taking an overview of resources for both SPD and SPMW. Each Zone EAC prioritises the incidents for scouting and their subsequent repair. Every three hours the HO EAC chairs a scheduled conference call with Zone EACs for an update regarding incident numbers and resource requirements so that resources can be prioritised and sent to optimum locations for customer supply restoration. This is part of a fixed agenda which also covers safety, weather updates, network security, customer contact centre performance, stakeholder messages and logistics.

Two Zone EACs (North Wales and Dumfries) had customers without supply overnight on 27 December (SPD 200 and SPM had 1543). The restoration of these had been delayed due to the continuous high wind, which had prevented safe working at heights. More customers were affected as the storm continued.

Overall, there were 98 customers without supply for more than 48 hours; most of these were known to be empty holiday homes, non-critical unmanned sites, or homes with their own generation. Any customer who was without supply for greater than 48 hours was offered overnight accommodation at SPEN's expense. The overall response from staff to the call for assistance in dealing with the emergency was deemed by SPEN to be good.

4.2 Weather forecasting

SPEN uses the services of the MeteoGroup and is satisfied with the service provided. SPEN has used MeteoGroup for approximately 10 years having moved away from the Met Office. SPEN believes that the service MeteoGroup provides is, in general, more accurate than the service it previously received. SPEN reports that, on this occasion, the predicted winds of 90mph were less than the reality experienced (109 mph).

MeteoGroup provides a detailed forecast for one and two days ahead and a further 3 to 5 day forecast. From early December through to the first week in January a daily 6 to 10 day outlook is also provided.

The weather forecast is placed on SPEN's intranet and also distributed to key staff within SPEN. SPEN's territory was affected by the severe weather during October 2013, December 5/6 and the Christmas storms, which hit in the early evening of 26 December.

As outlined above, SPEN also uses the forecast wind speed as an indicator of the severity of any likely system emergency. The evidence confirms that SPEN began to prepare for the system emergency based on the forecasts on 16 December when a review was carried out regarding resource availability.

5 Response and restoration

5.1 Restoration strategy

SPEN prepares for the Christmas period by ensuring that its network is as secure as possible and, prior to Christmas 2013, it was so by 22 December with no planned outages affecting customers allowed between 23 December and the New Year. In addition, SPEN's standby staff was doubled over this period as a matter of routine.

SPEN's normal practice is also to allow up to a maximum 50% (less for shift staff) of the workforce to take leave over this period.

On 17 December a request was made to all staff to make themselves available to assist if the need arose and a list of all the additional available staff was prepared. The availability of staff was categorised into staff scheduled to work, staff on standby and staff who would be available to respond to an emergency situation. In addition, similar checks were made regarding the availability of contractors – overhead line resources and tree cutting services. However by this stage, some of the contract overhead line staff were no longer in the UK and were therefore unavailable for deployment during this system emergency. SPEN, whilst not believing this to be a material factor on this occasion, has acknowledged it as a possible area for strengthening by SPEN and future contractual arrangements will be put in place to enhance out of hours cover throughout the full year.

In general, staff responded well to this request – SPMW's people responding slightly better than SPD as there were more people in the north that had travelled away for their festive celebrations and were therefore unavailable.

The high winds did not affect SPEN's area until the evening of 26 December and the early hours of 27 December. SPEN controls about 13% of the country's overhead line staff and is responsible for some 14% of the country's overhead line network.

The sustained high winds over an 18-hour period prevented early restoration work. As soon as it was safe to enable working at height, staff were deployed on restoration work. During this period there were 81 DNO staff on recognised standby each day. There were a further 209 DNO staff deployed on emergency work during this same period. In addition, there were 77 contractor overhead staff on standby per day and 24 per day were secured to assist on restoration work.

As discussed earlier, during this emergency SPEN's HO EAC adopts the strategic role in taking an overview of resources for both SPD and SPMW. Each Zone EAC prioritises the incidents for scouting and then prioritises their subsequent repair. Prioritisation of repairs is based on the following factors – safety issues, large customer numbers being affected and vulnerable customers given priority over other faults. SPEN's emergency plan and procedures recognise that any prioritised restoration approach needs to remain dynamic to new events or requirements and include appropriate repairs to strategic circuits along with customer restoration.

Throughout the event escalation information texts and updating briefing notes were sent out to staff who were working on restoring supplies.

SPEN is reliant upon four service providers for supplying and connecting temporary generation to its network. It also owns a small fleet of twenty mobile generators and is currently reviewing how these will be more effectively managed during future events.

Following the experience of the winter, the overall size of SPEN's generator fleet will increase and a dedicated generation team established to operate throughout any future event mobilising generation from day one. SPEN has teams that have been trained in the installation of 'flood protection kits'. These were not required by SPEN during the Christmas period but one kit was dispatched for use by SSES in Portsmouth.

5.2 Effectiveness

In SPEN's area the Christmas event was a category 2 severe weather event within the Ofgem definitions.

In SPD all but 19 customers were restored within 48 hours, the 19 went over by just 30 minutes. In SPMW there were 79 customers affected for more than 48 hours Restoration times were affected due to the 18-hour period when the wind was in excess of 60 mph and therefore no repair work could be started until it was safe. In addition, some roads were blocked, restricting vehicular movement.

No helicopters could be deployed until day two when the storm abated allowing them to be flown to gather damage information in areas of Dumfries affected by the storm.

Although SPEN recognised at an early stage that additional resources would assist in its response time and in anticipation of storms the first national NEWSAC call was held, on 23 December and calls continued throughout the period. SPEN requested assistance via NEWSAC on 27 December. Due to the widespread nature of this event SPEN was unable to release resources; and no additional resources were made available to SPEN. As mentioned above, SPEN has the flexibility to move resources between its licensed areas.

6 Keeping customers informed

6.1 Overview

Following a major power supply interruption all DNOs recognise the importance of keeping their customers informed on the progress of restoration and, with large numbers affected, this can only be achieved by the effective use of a telephony platform and associated systems combined with the skills and experience of staff to manage, operate and utilise the various available facilities.

All DNOs have implemented a telephony platform with call handling and messaging facilities; differing only in technical aspects and the level of unification between the various systems that deliver and present the required information. Applying computer telephony integration (CTI) technology, a total unification strategy would provide a complete network to desktop infrastructure, including comprehensive functionality at individual workstations.

In general, the technical aspects of each DNO's telephony platform is adequate and fit for purpose and other than short-term technical faults, performance can be characterised by the quantity of calls answered within an acceptable time and the availability and quality of messages which satisfy customers' expectations.

The review visit enabled meetings with SPEN's staff at all levels directly involved during the Christmas emergency including customer-facing call advisors.

Assessment process

The review of SPEN's telephony platform, the associated computer-based systems and communications networks was conducted at a high-level.

The assessment focused upon SPEN's effectiveness in keeping its customers informed with accurate and timely supply failure and restoration information during the Christmas emergency period. The main areas reviewed covered the acquisition, accessibility and delivery aspects of the information to customers through the telephony platform and other media.

6.2 Planning and preparedness

Rehearsal and stress testing are scheduled for the autumn months and only deployed if no actual emergency event has occurred during the year. During 2013

both of SPEN's licensed areas experienced events in which its Emergency Action Centres (EACs) were fully operational. In addition, SPEN's Emergency Plan requires that all its EACs' equipment is checked monthly to ensure its state of readiness.

Both SPEN licensed areas experienced adverse weather during early December 2013 and, with the advanced weather warning, equally prepared for that predicted to occur on 26 December.

6.3 Acquiring information

Early indications of the potential damage caused by the winds are alerts from the network control centre systems, which continuously monitor the higher-voltage power networks. Indications of loss of supplies are passed from the control centre systems[12] via the fault management system to the interactive voice response (IVR) facility. The IVR then makes available a geographically tailored message for incoming customer calls. At low voltage, customers' loss of supply calls are registered automatically by IVR or manually by call advisors into the fault management system, thereby providing additional information to despatchers and control engineers who may not be aware of a particular fault. The message team verifies the extent of the incident and manually selects an appropriate IVR voice message and texts the same message via SMS to customers who have registered for this service. The same information is also available to the contact centre call advisors who can inform those affected customers who elect to speak to an advisor.

The telephony platform[13] facility for automatically linking customers' telephone numbers[14] with the fault management system is a very effective way of making fault information available and reducing the volume of queued calls waiting to be answered.

Key information comes from the field teams working on repairs who may use handheld devices to directly enter details into the fault management system; location, nature, impact on public safety and restoration progress updates. Again, this information becomes available to all staff with access to the company's fault management system.

SPEN aims to update any IVR and SMS message within 10 minutes of new information becoming available. This process is monitored on a daily basis to ensure consistency.

SPEN reported there were no issues with the communication systems between field staff and control centre or dispatch during the storm period. However in the initial stages of a system emergency, the quantity of calls has the potential to become a bottleneck due to the disparity of staff numbers between field and control centre. It is recognised that, in the first hour of an emergency, with the technology now available, a control engineer may be more effective in restoring customer supplies by using remote tele-controlled switching than in dealing with more localised operations carried-out in the field.

6.4 Communicating the information

Incident information available to customers is taken direct from the fault management system ensuring that it is as consistent, accurate and as up-to-date as is achievable.

[12] ENMAC™ / PowerOnFusion™
[13] Vodaphone STORM®
[14] If registered

SPEN communicates with customers through the customers' channel of choice; inbound telephony with options for speech contact; IVR speech; SMS messaging; proactive outbound calls; website; Facebook and Twitter.

SPEN's CTI platform automatically links customers' telephone numbers with incident information enabling the call advisors to view the information as the customer's call is answered. This is the only effective way to make so much information available and reduces the talk-time (duration) of the call. The system is configured to handle the majority of calls within the IVR, which with good messaging, limits the number of customers who wish to speak to an advisor, generally to the most critical calls.

6.5 Systems and their resilience

The CTI systems[15] provide all system users with the same information so that staff anywhere in the company can access it, including those working from home if required.

Local interconnectivity is provided by duplicated local area networks and connections to remote key locations and offices are provided by a private wide area network, using secure connections within Vodaphone's high capacity, high-speed digital communications network.

The call-handling and messaging systems have the capacity to handle large volumes of telephone traffic and to delivery messages via IVR or SMS very effectively.

Third party service providers were informed in advance of the pending event and all planned IT work was suspended. No issues affecting SPEN's CTI systems and associated communications networks were experienced during the Christmas period.

6.6 Resourcing

The SPEN Distribution Call Centres (DCCs) are located in Kirkintilloch for SPD and Prenton for SPMW; the two DCCs being configured to function as a virtual single entity.

Both DCCs have a pool of trained advisors to handle calls during business as usual (BAU) if no advisor is available for a period of time (normally configured for 20 seconds) then an automatic overflow facility is invoked by which the pool is expanded to include any available back-office person who is trained as a call advisor. During a system emergency waiting time may be extended in response to the high call volumes combined with SPEN's 'no disconnect' policy, allowing any caller wishing to speak to an agent to hang on to do so.

6.7 CTI platform effectiveness

The review has shown that SPEN's CTI systems and communication networks provide a secure and flexible platform for supporting the DCCs and the company's overflow facilities. The call-handling and messaging systems have the capacity to handle large volumes of telephone traffic. No issues affecting the operation of internal or service providers' CTI systems and communications networks were experienced during the Christmas period.

[15] ENMAC™/PowerOnFusion™, STORM® and ACD

Call advisor staffing effectiveness

SPEN's DCCs are operated as a virtual single DCC and for the purpose of this review the KM data has been combined.

To assess of the adequacy of the advisor staffing the following measures were considered:

- The abandonment rate;
- Wait-time; the mean time taken for response by an advisor; and
- The number of advisors answering calls.

Answering customer calls

Answering all customers' calls by call advisors within an acceptable wait-time depends upon matching the number of advisors to the call volume, which is highly volatile, with significant and sudden peaks especially at the start of a system emergency. In the situation of the volume of incoming calls exceeding the number of free advisors calls will be queued and there will be a wait-time before the call is answered. The availability of an advisor becoming free is dependent on the duration of the call and any associated processing work, such as updating the company's incident database.

The customer has the option to abandon the call at any time while waiting; the longer the wait the more likely the call will be abandoned. Based on an acceptable wait-time[16] the abandonment rate (AR) is often used as a service measure, the target being appropriate to the service offered. In the case of emergency lines a very low abandonment rate must be targeted.

SPEN's call handling automatic overflow facility reduces the wait-time to a minimum of 20 seconds during BAU and with the policy of never terminating a call some customers will experience long wait-time during periods of high call volume when no advisor in the pool are free to answer a call.

The abandonment rate is the ratio of the number of abandoned calls to the total number of queued calls. The abandonment rate is not just dependent upon answer time; type of call, time of day, caller tolerance, and availability of alternatives may all be factors.

[16] Variable under the control of the Contact Centre

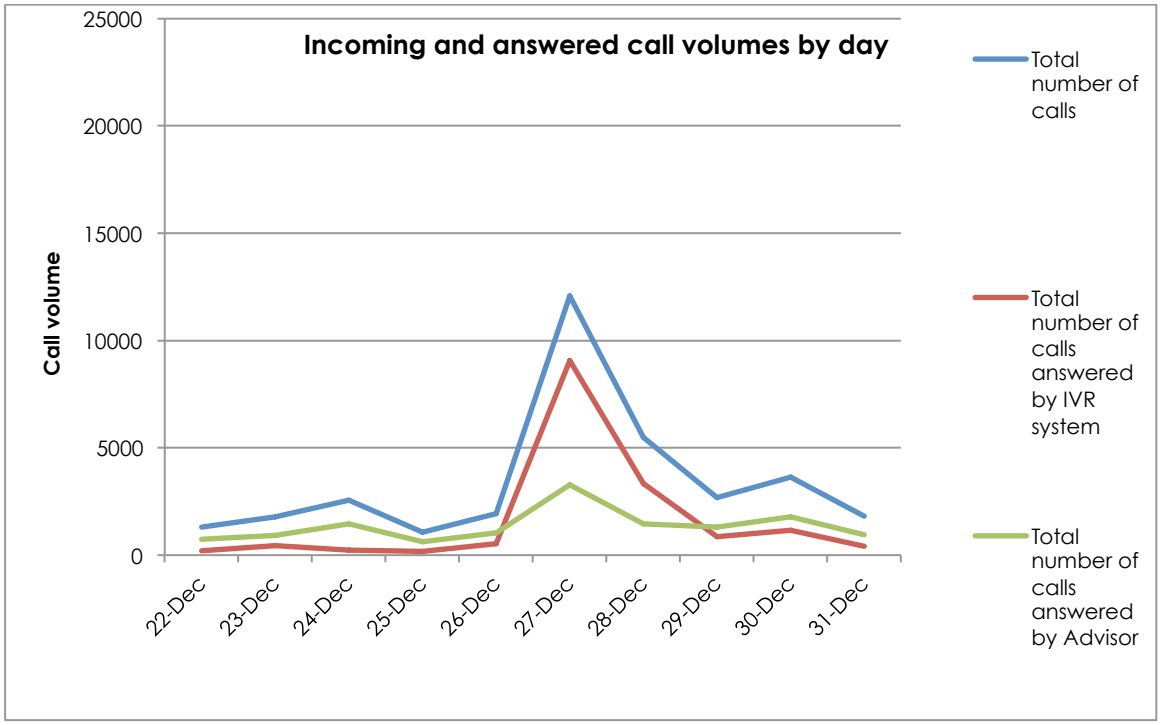


Chart 1 – Association between incoming and answered calls SPD and SPMW

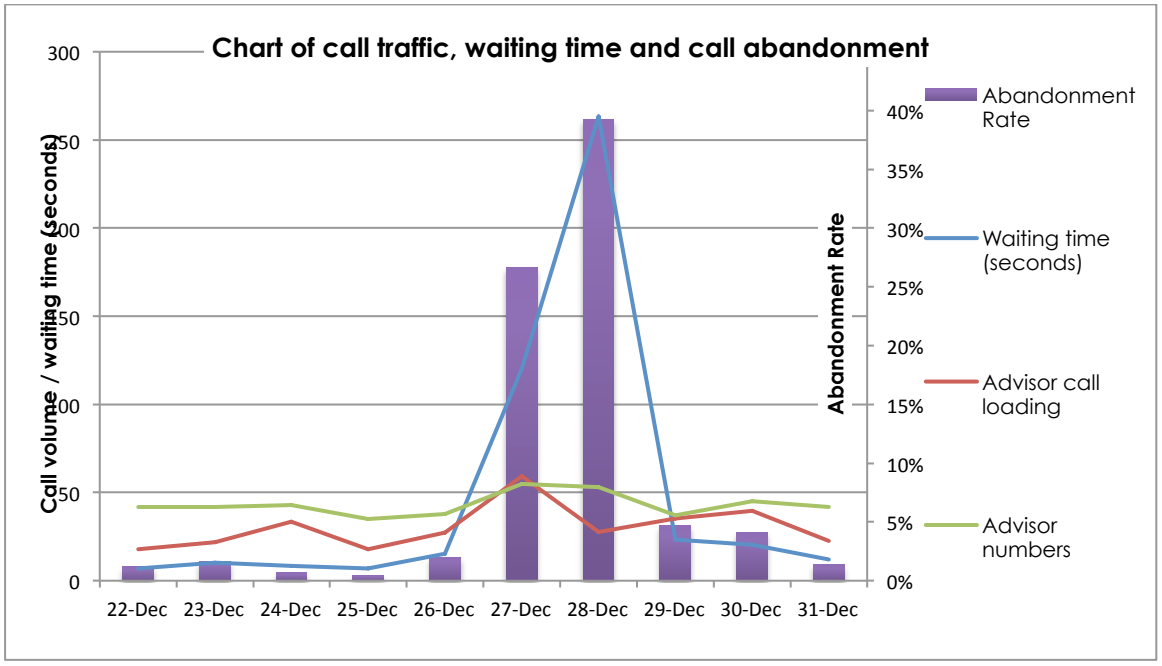


Chart 2 – Association between incoming and answered calls SPD and SPM

KM1	12065		KM2/KM1	75%
KM2	9058		KM3/KM1	27%
KM3	3265		KM5/KM1	10%
KM5	1186		Total	112%

Table 1 – Peak total call volumes - 27 December 2013

Observations

From Table 1 it can be seen that 75% of the calls were answered by the IVR and 27% answered by advisors, with unsuccessful calls at 10%.

Chart 1 illustrates these figures and shows a 3:1 ratio for IVR-answered and advisor-answered calls.

Either side of 26 and 29 December the ratio is reversed with more advisor calls being answered then by IVR.

The staffing and call loading profiles shown in Chart 2 indicate that the staffing / loading were well matched to keep the waiting times low. The waiting times increase from the 26 December reaching 263 seconds during the 28 December. Although the staff numbers were increased, the abandonment rate rose correspondingly with the waiting time, from 27 December, peaking on the 28 December at 39%. Waiting time and abandonment rates may also be affected by other factors, as indicated on 28 December when the loading went down but abandonment rates and waiting times are reported as increasing.

7 Internal review, evaluation and follow up

7.1 In-house reviews

SPEN conducted a full review of events and submitted data to both the Ofgem stage 1 and DECC reviews, together with a follow-up report on 1 May to Ofgem.

A SPEN Panel of Enquiry carried out a full review of all the December exceptional events across both licensed areas, which resulted in 55 recommendations being presented to the SPEN executive team. All recommendations will be implemented. A copy of this review was made available during the visit.

7.2 Network condition and resilience

The technical standards are set out in the company's Long Term Development Statement for each licensed area. SPEN's distribution networks are designed to ENA standards and, like other DNOs, it has legacy networks inherited from the two licensed areas that make up the current DNO. SPEN retains the legacy standards in situations where it undertakes overhead line refurbishment work but, when a full rebuild is done, 'modern' heavier and more robust design standards are used. In particular, these new standards are targeted for main lines in areas most prone to severe weather and to those supplying high numbers of customers.

SPEN provided details of its current and historic design standards. The heavier construction standards were introduced early in the 2000's following experience in the system emergencies of 1998 and 2001. These revised design standards were introduced alongside the policy of removing trees within falling distance of overhead lines in accordance with risk assessed requirements of ETR132. These revised design standards have been reviewed a number of times and, on each occasion, the strategy was confirmed as appropriate. SPEN advises that a further

review will take place after the winter period for both SPD and SPMW. The company does not consider that legacy networks are a significant factor in explaining the differences in supply restoration performance; companies have had some 25 years of autonomy within which to address those issues that they regard as fundamental to the resilience of their networks.

SPEN has introduced programmes of installing network automation and improving its tele-control capabilities to provide an improved service to its customers in both licensed areas. This is reflected in the year-on-year reduction in CI and in CML. In common with all DNOs, SPEN is also improving its network reliability by replacing ageing plant and equipment.

7.3 Learning from others

Along with other DNOs, the company is taking on board and co-operating in delivering DECC action plans and taking forward actions which will further enhance its capability and customer service provisions.

8 Review of performance against success factors

Ref	Activity	Review of SPEN's Performance
SF1	Emergency plans and advance preparation	❑ SPEN has a fit for purpose suite of emergency plans, processes and procedures in place identifying the level of emergency, responsibility and contact details of key individuals when dealing with system emergencies. Within the Emergency Plans, SPEN is subdivided into local 'EAC' zones. These plans are regularly reviewed, updated and revised as required based on each event experience and are all reviewed at the end of each winter period. ❑ SPEN operates its two licensed areas as one business and, during system emergencies, the HO EAC at Ochil House adopts the strategic role in reviewing incident numbers and resource requirements for both. There are two dedicated distribution call centres (DCCs) – one at Kirkintilloch (SPD) and the other at Prenton (SPMW). Each licensed area is subdivided into six zones and during system emergencies each zone EAC prioritises its incidents for scouting and repair. ❑ SPEN experiences two or three Level 2 or Level 1 emergencies annually so it uses these in place of formalised emergency rehearsals to test systems, processes and roles. ❑ SPEN prepares in the autumn for the anticipated increase in network activity over the winter. SPEN carries out a review regarding what additional resources and equipment it will require to cater for the reasonably anticipated system emergencies over the winter period. Additional four wheel drive vehicles are secured along with helicopter availability. As confirmed in its autumn review, it is normal practice for SPEN to allow up to half of its workforce to take holiday over Christmas. ❑ Network security is further enhanced should there

Ref	Activity	Review of SPEN's Performance
		be any system emergency over the winter period by ensuring that the network is restored to normal by 22 December and no planned outages are permitted over the holiday period. ❑ SPEN`s plans and procedures have been well tested and have been shown to be effective in recent events. ❑ A SPEN Panel of Enquiry carried out a full review encompassing all of the December exceptional events across both licensed areas, which resulted in 55 recommendations being presented to the SPEN executive team. All recommendations will be implemented during 2014.
SF2	Weather forecasts, prediction of impact and resource requirements	❑ SPEN uses the services of MeteoGroup for its weather forecasts on a daily basis. MeteoGroup provides a detailed forecast for day one and two a further three to five day forecast. From 12 December through to the first week in January a further 6- to 10-day outlook is provided. ❑ The weather forecast is placed on SPEN`s intranet and also distributed to key personnel. ❑ SPEN uses the forecast wind speed as an indicator of the severity of any likely system emergency. ❑ SPEN began to prepare for the system emergency based on the forecasts on 16 December 2013 by reviewing likely resource requirements and availability above its already enhanced arrangements for the Christmas period. ❑ MeteoGroup predicted that winds of 90+ mph would hit the SPEN area. Based on this wind prediction SPEN moved to a level 3 emergency (any wind speed greater than 60 mph triggers an escalation to level 3). MeteoGroup's predicted wind speed was less than the actual wind experienced (109 mph). ❑ Along with other companies SPEN is working with DECC on industry best practice.
SF3	Early reaction and mobilisation	❑ SPEN had already an enhanced standby in place for the Christmas period. ❑ In addition SPEN advised all its staff on 17 December of the likely impending system emergency over the Christmas period requesting their help. A list of all additional staff was prepared and how these resources could be used. However, in future SPEN will review contractual arrangements with its direct staff to improve resource availability, particularly over holiday periods. ❑ A similar request was made to contract overhead line and tree cutting services contractors. However, at that time some of the overhead line contract staff were no longer in the UK and were

Ref	Activity	Review of SPEN's Performance
		unavailable to assist. ❑ Though not considered material on this occasion, SPEN has recognised the lack of contractors' availability as being a problem that must not recur and hence future contractual arrangements will ensure a more robust cover throughout the full year. ❑ Due to the 18-hour sustained period of high wind and the associated danger due to wind-borne debris, field staff were unable to be deployed to commence restoration work until it was safe to do so. The high winds affected the SPD and SPMW areas on 26 December and through the morning of 27 December.
SF4	System automation to restore bulk customer numbers	❑ Along with other DNO`s, SPEN has invested heavily on system automation within both of its licensed areas to enable automated restoration of high customer numbers thus helping to minimise CI and CML. Automated restoration occurs in the following manner within SPEN – auto reclose, system automation schemes and logical sequence switching schemes written into its 'Power on Fusion' Network Management System. ❑ Further restoration is achieved by the Control Engineer using tele-controlled remote switching.
SF5	Telephone response & answering service.	❑ The STORM® platform used in SPEN appears to have coped with the call volumes presented in December and, with further configuration, sets SPEN well for future events. ❑ Staff levels were well matched to call volumes, other than the peaks of 27 and 28 December when call volumes increased rapidly corresponding to supply failures. ❑ The waiting time and abandonment rate increased significantly on 27 and 28 December indicating that customers were not always satisfied with the messaging service and opted to queue until an call advisor was available. High call volumes, longer call durations and SPEN's 'no disconnect' policy is likely to have had a significant effect on subsequent extended waiting times.
SF6	Gathering field information	❑ SPEN had all of its EACs open early on 27 December. ❑ SPEN uses field staff as scouts to gather information concerning network damage. Each zone EAC prioritises the incidents for scouting and repair. Scouts and field teams send photos of any network damage back to the centre with its GPS location for entry to its information system. SPEN is considering extending this to enable customers to send in similar information.

Ref	Activity	Review of SPEN's Performance
		❑ Every three hours SPEN's HO EAC holds a conference call with all EACs for updates regarding incident numbers and resource requirements so that they can be prioritised and sent to the optimum locations for customer supply restoration.
SF7	Processing Information	❑ SPEN, along with other DNOs, has invested in new technology in supporting the processing of information from the customer, network and field staff that enables it to quickly identify the likely numbers of faults, likely number of resources required and estimated restoration times. ❑ SPEN uses STORM® as its telephony platform. Although this performed well, SPEN is currently looking at how it may be able to further enhance its overall performance. ❑ SPEN uses the Power On Fusion Network Management System (NMS) which links in with the STORM® telephony system ensuring that network data is available to call advisors enabling incoming call data to link to network data where caller line identifier is available.
SF8	Rapid dispatch of switching resource to site	❑ SPEN has responders who attend site and are authorised to perform high voltage switching. These are normally single person teams who are deployed to site to optimise customer restorations based on information provided from Power On Fusion.
SF9	Ensure adequate resources in terms of people, transport materials	❑ As stated in SF1, SPEN prepares in the autumn for the winter period. SPEN reviews its requirements for additional resources and equipment to cater for the reasonably anticipated system emergencies. Additional four wheel drive vehicles were hired for the winter period along with ensuring helicopter availability. It is normal practice for SPEN to allow up to half of its workforce to take holiday over the Christmas period. This was confirmed in the autumn review. ❑ As an early response to the predicted adverse weather on 17 December a request for further assistance was made to both direct staff and contractors. ❑ SPEN routinely reviews stock levels and logistical arrangements, and had no issues.
SF10	Adequate overhead line staff	❑ SPEN has two licensed areas, each with large overhead networks. It employs both direct overhead line staff and also contract overhead line resources. In addition its employs contractor tree cutting services. ❑ SPEN was offered linesmen from its parent company, Iberdrola in Spain. On this occasion the offer was declined due to the lead time in making

Ref	Activity	Review of SPEN's Performance
		them effective. This is an area that may be explored in the future. ❑ SPEN is working closely with its contractors and four local colleges to increase the numbers of linesmen available by encouraging apprenticeships. SPEN provides trainers at each of the colleges.
SF11	Management of repairs	❑ As stated in SF6 above, every three hours the HO EAC holds a conference call with all EACs for updates regarding incident numbers and resource requirements so that they can be prioritised and sent to the optimum locations for customer supply restoration. ❑ This normally means that high voltage faults affecting customers are dealt with as a priority.
SF12	Manage the event tail	❑ All customers in SPD were restored in 48.5 hours and in SPMW within 65 hours. As already stated, restoration times were delayed due the severity of the winds over an 18-hour period and the dangers associated with working at height in these conditions.
SF13	Mobile Generation	❑ SPEN is mainly reliant upon four service providers for supplying and connecting generators. It has a small fleet of mobile generators in house. ❑ SPEN has reviewed its approach to the use of generators and, in future, dedicated generation teams will be deployed on day one and used as appropriate.
SF14	Use of all media channels to communicate with customers	❑ All means of communication with customers were used. SPEN recognises that customers expect more than telephone messaging for information during electricity supply failures. SPEN has used social media, in particular Twitter, to update its customers on restoration progress. This service is also provided in Welsh. ❑ SPEN's website allows interaction with its customers particularly in providing updates on fault progress. The Power On Fusion NMS also provides the facility for automated messaging to SPEN's customers. ❑ Field teams provide progress feedback to the centre and dedicated message coordinators in SPEN's DCCs upload these directly to the telephony system which is also linked to the Internet postcode fault look-up service.
SF15	Provide realistic estimates of repair duration and informing customers	❑ All DNOs recognise the need to give the most accurate estimates of restoration times (ETRs) that they can. SPEN achieves this by using all of the communication channels as outlined in SF14 and the regular updating of the information obtained from the field. ❑ Over-optimistic restoration times can lead to

Ref	Activity	Review of SPEN's Performance
		customer dissatisfaction and therefore the role of the dedicated message coordinators is key to the success in keeping customers accurately informed.
SF16	Provide feedback to customers with regular updates	❑ Through the linked services of STORM®, Power On Fusion™ and the technical internal links that the systems provide, SPEN produces messages for its customers which are timely and as up to date as possible.
SF17	Local presence and community contacts	❑ SPEN's area is divided into zones and during system emergencies the zone EACs prioritise incidents for scouting and repair. SPEN considers it important that each local unit manages its own scouting and prioritisation of incidents, using local knowledge to best effect.
S18	Provide adequate welfare facilities to PSR customers from start of event and to all customers who are without supply for more than 48 hours	❑ There are around 400,000 customers on SPEN's priority services register. A dedicated 'phone line was established for vulnerable customers who could contact SPEN between 10am and 8pm regarding any welfare issues or concerns they were experiencing. ❑ Vulnerable customer support packs are distributed by SPEN – these packs contain a blanket, hand warmer, torch and analogue phone. ❑ During the emergency, the SPEN Customer Liaison Officer works closely with the Local Authority Emergency planning offices regarding supporting vulnerable customers. SPEN's Customer Liaison Officers carried out home visits to provide support where requested and acted as a link with the Red Cross. ❑ Customers without electricity for more than 48 hours were offered overnight hotel accommodation at SPEN's expense, some 40 customers taking up the offer. ❑ Overall, there were 98 customers without supply for more than 48 hours. Most of these were non urgent restorations as described above.

Appendix 4 Scottish and Southern Energy Power Distribution (SSEPD)

1 Summary

SSEPD suffered one of the most sustained period severe weather events in recent years, resulting in 1,091 network incidents, interrupting electricity supplies to 228,474 customers on its southern networks. 5,915 were without supply for more than 48 hours, the worst case being 127 hours.

SSEPD's telephony system is focused on two call centres. In December 2013 the south call centre had installed a new system, STORM®, and the north was still using its legacy system. While the two call centres were linked and operating as a virtual call centre the indications from answer time statistics are that the call sharing between the centres was not completely effective. This may have been a contributory factor to the long answer times and high rate of abandoned calls. The automatic messaging systems appear to have left a large number of customers still wanting to speak with an advisor so they were not contributing as they should have to reducing the demand on call takers. More significantly, SSEPD was unable to adequately increase its call centre staff level to meet the increase in demand. SSEPD's supply business call centres, which are its normal back up facility for support were unavailable during the Christmas holiday period. This was a further contributory factor to the long answer times and high rate of abandoned calls. As a result, answer times rose to almost 14 minutes on Christmas Eve with an abandonment rate of 80%.

SSEPD operates 21% of the country's overhead line networks and in total employs 20% of the country's skilled overhead line strength, with a heavy dependence on contractors in the south and a significant lead time involved if staff have to move from north to south, or vice versa. Over the Christmas period, SSEPD was also under a severe weather warning in the north making staff transfers a high risk measure.

SSEPD reports that it was unable to call in sufficient numbers of its overhead line staff to carry out repairs more quickly, achieving 34% utilisation of its total overhead line resource during the 5 days of the emergency event, dropping to 26% working on Christmas Day.

2 The company

Scottish and Southern Energy Power Distribution (SSEPD) is one of two DNOs that holds distribution licences for areas with non-contiguous boundaries and, of the DNOs with multiple licences, SSPED's licensed areas are separated by the greatest physical distance. In the case of SSEPD, one licence is in Scotland and one is on the south coast of England. This unique characteristic brings both advantages and disadvantages. The maximum possible separation distance between areas reduces the likelihood of severe weather events affecting both networks coincidentally but makes for significant costs and response time for internal transfers of resources to support emergency restoration work. Decisions cannot be taken lightly with regard to transferring staff when there is a risk of severe weather at both ends of the country.

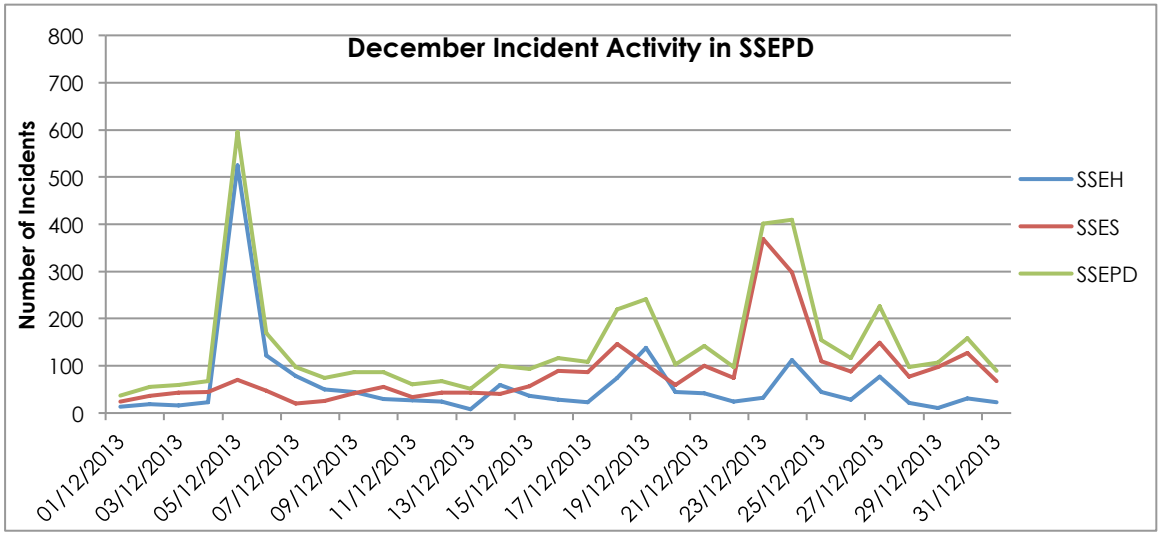
SSEPD delivers electricity to customers across a 17,000 km^2 service area in the south of England and 56,000 km^2 in the north of Scotland.

The two networks are quite different in nature, in Scotland the network is spread over an extremely large, but relatively sparsely populated area of Great Britain while

in the south it has one of the most densely populated mixed urban and rural networks.

3 The event

3.1 December incident activity in SSEPD



3.2 Scale of the event in SSEPD

SSEPD (SSES) was first impacted on 23 December with the event profile below:

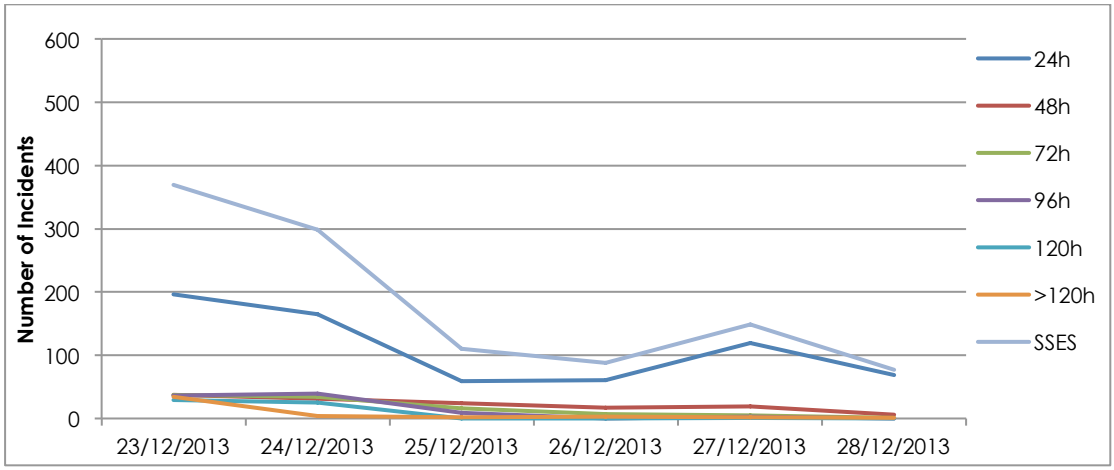
Number of short interruptions (<3mins)	406,772
Number of incidents	1091
Number of Customers losing supply (3 mins and over)	228,474
Number restored within 1 hour	76,624 (33%)
Number restored within 24 hours	222,559 (97.4%)
Number restored within 48 hours	225,789 (98.8%)
Number without supply > 48 hours	5915 (2.5%)
Customer longest without supply	127 hours

SSEPD (SSEH) was first impacted on 27 December with the event profile below:

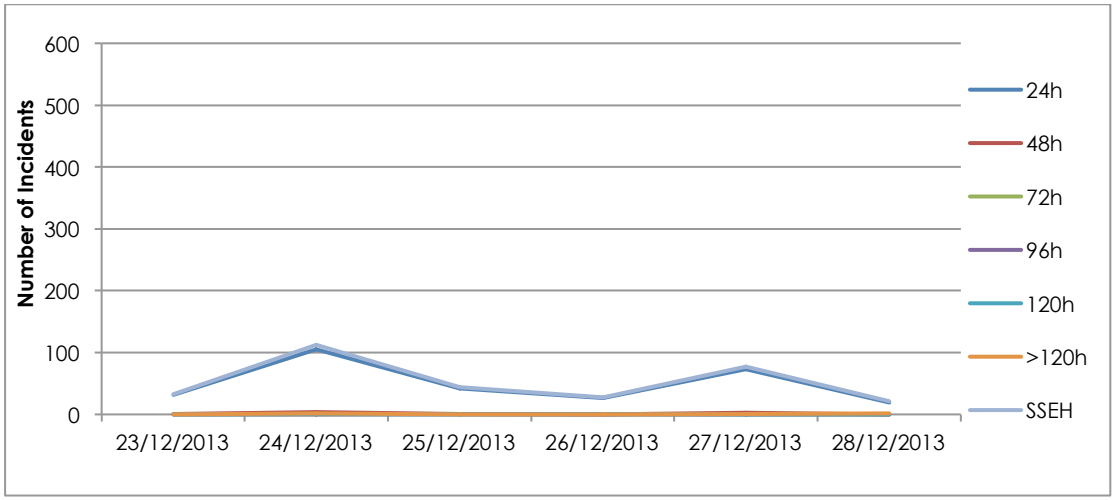
Number of short interruptions(<3mins)	105,608
Number of incidents	315
Number of Customers losing supply (3 mins and over)	35,437
Number restored within 1 hour	17,800 (50%)
Number restored within 24 hours	35,425 (99.9%)
Number restored within 48 hours	35,433 (99.9%)
Number without supply > 48 hours	4
Customer longest without supply	108 hours

3.3 Incidents per day with repair periods by licensed area

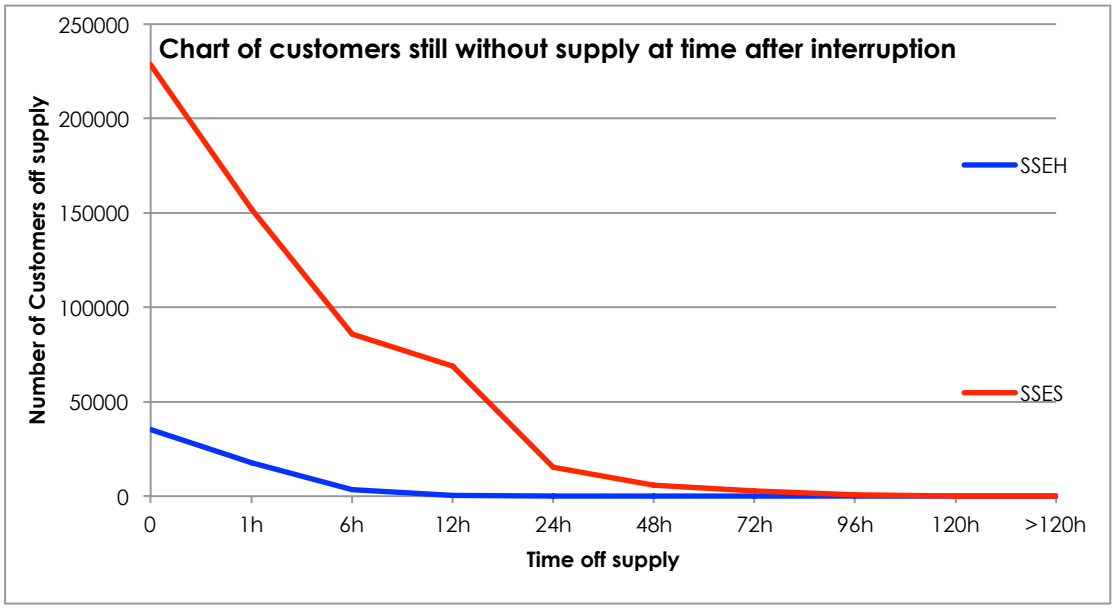
SSES



SSEH



3.4 Customers interrupted (3mins and over) and restoration times



4 Planning and preparedness

4.1 In house plans and procedures

SSEPD has a suite of plans and procedures covering the preparation for, and response to, a weather-related system emergency. These plans have been in existence for many years and have gradually evolved taking due account of experience from any events that have occurred, changing requirements and advances in technology available to support restoration of supplies. SSEPD's emergency plans were reviewed in February 2002 and found to be fully fit for purpose. In October 2002 the plans were reviewed following the emergency event and were found to have performed well with very few recommendations for improvement. The minor issues that were raised for performance improvement have been further reviewed in May 2014 and were found to have been either substantively delivered, or superseded by on-going organisational and technology developments.

SSEPD's document PR-PS-034, 'Emergency Response Procedure for Power Distribution Network Emergencies' covers weather related events, supported by a specific document PR-PS-055 designed for flooding situations. Document PR-PS-424 further describes roles to be adopted in SSEPD's regional emergency centres.

SSEPD also has emergency plans to cover Black Start, Demand Control and Rota Disconnection, which were not considered under this review.

SSEPD's plans have stages of Alert Condition, colour-coded based upon the expected duration of supply interruptions for customers. At the most severe level, Deep Red, for events expected to last beyond 48 hours, escalation to the SSE Group Board is required.

SSEPD reviews its plans and procedures on a regular basis, the most recent routine review being carried out early in 2013.

SSEPD's emergency plans allocate key roles and responsibilities and do rely on a degree of formality. Having said that, the plan actively involves SSEPD's senior

managers and directors in the decision-making process. The key difference from business as usual is that, in an emergency, based on an alert status, a Power Distribution Alert Team (PDAT) is established consisting of senior managers and directors. This team then takes on strategic decisions for running the emergency response and does not formally stand down until the last customers' supplies are restored, or the on-going incident rate has subsided to business as usual levels.

SSEPD normally operates two network control centres, one at Perth and one in Portsmouth. Each control centre has an adjacent dispatch centre and customer contact centre and these centres become the focus of operations in an emergency event. The two control centres have compatible systems and can, in principle, each take control of parts of the other's network though there are differences between the two ends that make it not straightforward to do so. A similar situation exists for the call taking systems, with both Perth and Portsmouth now using the STORM® telephony platform, though this was not the case in December 2013, when Portsmouth had transferred to STORM®. Perth did not transfer until February 2014.

The PDAT normally operates from Perth but could be based in Portsmouth for a southern -only event.

SSEPD's routine daily processes are escalated in an emergency situation but, in common with other DNOs, the delivery of emergency repairs may be characterised as 'business as usual - only more', with the emphasis being on most people doing what they do as a matter of routine, meaning that during severe weather events most staff are routinely familiar with the duties associated with their role during an emergency.

SSEPD's emergency planning documents are brief and succinct. As in most effective plans they are based upon the sharing of common, regularly updated information including wide access to decision-critical information; weather forecasts, a real time screen allowing access to the incident management and network management system at each location and reacting promptly to severe weather warnings. Quick and flexible reaction is recognised as necessary since events will always be, to varying degrees, different from what has been predicted and different from previous events.

Over-reaction when events do not turn out to be as severe or prolonged or have different network impact to that which might have been anticipated will incur costs, which might otherwise have been avoided. SSEPD recognises this situation in making those decisions that involve north to south or vice versa movement of staff, though its plans do include an assumption that this will happen. These decisions are taken by the PDAT.

In addition to the systems and processes described below, there are organisational aspects of SSEPD's strategy that facilitate resilience and responsiveness in emergency conditions. Important among these are:

- The two licensed areas cover an area furthest north and on the south coast of the UK mainland. The chances of simultaneous events on the two licensed areas are considered unlikely so the company can decide upon the movement and optimisation of resources internally, without reference to NEWSAC;
- SSEPD has over 500 directly employed overhead line staff, and routinely employs almost 400 contractors, together amounting some 20% of the

available overhead line resource on the UK mainland, which is commensurate with its ownership of 21% of the overhead line asset;

- SSEPD has a mixed approach to the use of contract resources. As stated above, it has a mixed workforce on overhead lines but by far the majority of its contract staff are in the south. In the north, where resources are more thinly spread, including on the islands, direct labour, more multi-skilled than trade-specific is employed. The ratio of direct to contractor overhead line staff is high in the north and low in the south. SSPED has in-sourced certain key craft functions, such as those for tree clearance; and
- SSEPD operates its routine business from a number of depots and work reporting centres which are largely self-equipped to manage their own resources. They have direct access to the central information systems to keep the whole company position up to date for external reporting to, for example, DECC and for consistency of media reporting. Having resources based near to the work is a feature of SSEPD's operating philosophy.

In terms of event preparation, SSEPD has in place what are becoming standardised approaches and practices throughout the industry in terms of strengthening the staffing of control rooms; placing on standby 'ramp up' customer contact centres (In SSEPD's case: Perth and Portsmouth but also with other call centres in the SSE Group's supply business), as well as typically doubling routine out of hours standby for field staff over public holiday periods. It is also planning the introduction of home worker facilities ready to take calls in support of the call centres through peak periods.

SSEPD carries out a winter preparedness review each autumn to check that all of its key systems are functional and tested and that all special precautions are in place. This includes a diverse range of issues, from confirming increased stock levels of overhead line materials in stores, to confirming the availability of four wheel drive transport, including hiring in an additional winter fleet, through to more basic issues such as confirming emergency rooms are ready and equipped for an event and that contact details for all suppliers are updated. It is clearly not able to test for resource availability at any particular future date.

Like most DNOs, SSEPD operates a significantly sized fleet of 4x4 vehicles and variants for everyday use on overhead line work in difficult terrain. This fleet is augmented over the winter months by hiring in two additional four-wheel drive vehicles at each depot, which can be used by those staff not regularly needing this type of vehicle (for example: scouting, bringing in control or call handling staff when travel conditions are difficult, attending PSR customers or customer welfare centres).

4.2 Weather forecasting

SSEPD uses the services of the MeteoGroup and is generally satisfied with the service provided, which is always under review, particularly by SSEPD's two in-house forecasters who evaluate each alert that comes from MeteoGroup and add their own views on the likely network impact.

Arising from the sharing of good practice from the DECC review, the company will be taking a 10-day general forecast along with its detailed shorter term forecast and via NEWSAC sharing weather alerts with other DNOs[17].

[17] DECC review, recommendation F1 – Weather forecasting and escalation triggers.

The evidence confirms that, in response to forecasts of the 23/24 December event, SSEPD began preparing for escalation on 17 December. The severe weather hit the south of England, arriving from the south west as predicted on 23 December, with a sustained impact into 24 December.

In Scotland there was limited impact on 23 December, though still under a weather warning, and the storms hit Scotland on 27 December at a lower severity level.

5 Response and restoration

5.1 Restoration strategy

SSEPD's strategy is to restore incidents by prioritising on highest customer numbers first, moving down the numbers affected towards those incidents affecting a single premise. This approach catches the maximum number of priority services register customers who are reasonably evenly distributed across the network. Towards the later stages of the event the priority also has to turn to addressing those longest without supply, while addressing the needs of priority service customers on an individual basis throughout.

Clearing the faults and restoring customers within an acceptable timescale has benefits down the line in terms of lessening the levels of welfare and additional customer support required.

5.2 Effectiveness

The Christmas event was a category 2 severe weather event in the south of England, within the Ofgem definitions[18].

SSEPD's response to the severe weather warnings got off to a positive start with its emergency plans being invoked in good time (17 December) in preparation for the event forecast for 23 December. All facilities were confirmed as ready to escalate into a full-scale event. The weather that hit Scotland was less severe than in the south of England, with less than 100 network incidents occurring on the peak day of 27 December. The incidents in Scotland were all handled in-house and working to the emergency plans, indicating that the company coped well with this scale of event, which followed the Christmas holiday period so staff were naturally returning to work.

In the south of England, however, the weather was far more severe and according to reports from MeteoGroup was amongst the highest speed, longest sustained periods of adverse weather recorded in the UK. With this level of activity, while the emergency plans were in place and the facilities ready SSES did not cope as well over the Christmas holiday period as would have been expected from SSES in the past or from its emergency plans, either in delivering service to its customers or in keeping its customers informed.

SSEPD reports that in the south, of its 264 directly employed overhead line staff and 350 contractors it had an average of 188 (31%) of its overhead line staff at work between 23 and 28 December, with a peak availability of 247 (40%) on 28 December and 128 (21%) on Christmas Day, when there were several thousands of customers without electricity. SSEPD reports that, under its current terms and conditions of employment, it was unable to attract more direct staff into work and

[18] These and related definitions can be found in the 'Electricity Distribution Price Control Customer Service Reporting - Regulatory Instructions and Guidance' – see especially Severe Weather Category Boundaries.

that some of its contract resource were unavailable, partly due to living away from the area, or travelling away for the Christmas period.

In its two call centres SSEPD had a total average of 45 staff between 23 and 31 December, peaking at 76 on 30 December and dropping to 34 on Christmas Day. SSEPD reports a significant difference in call response times, in Perth the worst recorded daily average answer time was 71 seconds on Christmas Eve, while for the same period Portsmouth is reported at 821 seconds, a clear indication that the two call centres were not receiving the call distribution that might have been expected. A possible cause is that with one call centre working on the new STORM® platform and one still working on a different system the transfer and balancing systems were not as effective as expected. SSEPD's normal back-up telephone answering facilities, its parent group's four supply business call centres were unavailable through the holiday period.

In SSEH four customers were without electricity for more than 48 hours, these were dealt with as individual cases by SSEH.

In SSES there were 5915 customers without supply for more than 48 hours resulting from on-going system incidents including those masked incidents only becoming apparent as repairs to others were completed.

The number of customers without supply for more than 48 hours in the south has contributory factors beyond the control of the DNO that were entirely weather related. SSEPD however, acknowledges that shortage of staff was a significant factor, and the performance of its telephone response was not as expected.

SSEPD participated in NEWSAC conference calls but did not receive any assistance or understand that any assistance would be available before 27 December. No NEWSAC resource was available to SSEPD at the time of greatest need.

SSEPD has emergency plans in place that have previously given commendable service but on this occasion was let down by the major factors of availability of key staff groups and inadequate telephony systems.

By the most visible key indicators of customer call answer time and customer longest without electricity SSEPD performed less well at Christmas 2013 than it has on previous occasions.

The problems were not due to any deficiency in emergency plan design but appear to be more the lack of availability of overhead line staff and call advisors over the critical holiday period to deliver those plans. This, combined with timing of the change of telephony systems leading to incompatibility between the two call centres, caused SSEPD problems in its call centres. In the case of the non-availability of the Group's own supply business call centres to provide back-up this was foreseeable and within SSE Group's control and suggests the stress testing of the plans had not been carried out at the highest risk periods. With regard to overhead line staff, SSEPD has acknowledged that it was unable to attract sufficient of its staff to work over the Christmas period; this was arguably less foreseeable but within the control of the company to address and resolve.

6 Keeping customers informed

6.1 Overview

Following a major power supply interruption all DNOs recognise the importance of keeping their customers informed on the progress of restoration and, with large

numbers affected, this can only be achieved by the effective use of a telephony platform and associated computer-based systems combined with the skills and experience of staff to manage, operate and utilise the various available facilities.

All DNOs have implemented a telephony platform with call handling and messaging facilities; differing only in technical aspects and the level of unification between the various computer-based systems that deliver and present the required information. Applying computer telephony integration (CTI) technology, a total unification strategy would provide a complete network to desktop infrastructure, including comprehensive functionality at individual workstations.

In general, the technical aspects of each DNO's telephony platform is adequate and fit for purpose and, other than short-term technical faults, performance can be characterised by the quantity of calls answered within an acceptable time and the availability and quality of messages which satisfy customers' expectations.

SSEPD's customer service telephony platform serves both licensed areas[19] by unifying the IT and telephone systems through the STORM® call handling platform, introduced in SSES prior to the December Christmas storm and in SSEH during February 2014.

The review visit to SSEPD enabled meetings with staff at all levels directly involved during the Christmas emergency including customer-facing call advisors.

Assessment process

The review of SSEPD's telephony platform, the associated computer-based systems and communications networks was only conducted at a high-level.

The assessment focused upon SSEPD's delivery aspects of the information to its customers through the telephony platform and other media.

6.2 Planning and preparedness

In early autumn SSEPD completed an exercise to ensure that all systems and procedures were fully prepared for the coming winter period. This included checking the readiness of all IT and communications facilities.

With the possibility of storms around the start of Christmas, contingency planning was started on 17 December. The supply business customer service centres were alerted to be prepared to release call advisors when required.

6.3 Acquiring information

Early indications of the potential damage caused by the winds are alerts from the network control centre systems, which continuously monitor the higher voltage power networks. Indications of loss of supplies are passed from the control centre systems[20] via the fault management system to the interactive voice response (IVR) facility. The IVR then makes available a geographically tailored message for incoming customer calls.

At low voltage, customers' loss of supply calls are registered automatically by IVR or manually by call advisors into the fault management system, thereby providing additional information to despatchers and control engineers who may not be aware of a particular fault. The message team verifies the extent of the incident,

[19] Scottish Hydro (SSEH) and Southern Electric (SSES)
[20] ENMAC™ / PowerOnFusion™

manually selects an appropriate IVR voice message and texts the same message via SMS to customers who have registered for this service. The same information is also available to the contact centre call advisors who can inform those affected customers who elect to speak to an advisor.

The telephony platform[21] facility for automatically linking customers' telephone numbers[22] with the fault management system is a very effective way of making fault information available and reducing the volume of queued calls waiting to be answered.

Key information comes from the field teams working on repairs who may use handheld devices to directly enter details in to the fault management system; location, nature, impact on public safety and restoration progress updates. Again, this information becomes available to all staff with access to the fault management system.

SSEPD reported there were no issues with the communication systems between field staff and control centre or dispatch during the storm period. However in the initial stages of a system emergency, the quantity of calls has the potential to become a bottleneck due to the disparity of staff numbers between field and control centre. It is recognised that in the first hour of an emergency, with the technology now available a control engineer may be more effective in restoring customer supplies by using remote controlled tele-switching than in dealing with more localised operations carried-out in the field.

6.4 Communicating the information

Throughout the Christmas storms SSEPD made use of multiple means of communication with its customers. This included updates via local radio, newspapers and websites. SSEPD has a strong focus on helping its PSR customers with a number of dedicated staff actively calling these customers.

SSEPD also used located welfare vans in the worst affected communities.

Incident information available to customers is taken directly from the fault management system ensuring that it is as consistent, accurate and as up-to-date as is achievable.

SSEPD communicates with customers through the customers' channel of choice; inbound telephony with options; to talk with a call advisor, use the IVR facility; request SMS text message or SSEPD proactive outbound calls; website; Facebook and Twitter.

6.5 Systems and their resilience

The CTI platforms and communications networks enable company-wide access by authorised staff to process or view the fault information, including those working from home if required.

Local interconnectivity is provided by duplicated local area networks. Connections to remote key locations and offices are provided by a private wide area network, using secure and diverse connections within the Vodaphone high capacity, high-speed digital communications network.

[21] Vodaphone STORM® in SSES and Avaya / ACD system in SSEH
[22] If registered

The call handling and message systems have the capacity to handle large volumes of telephone traffic and to delivery messages via IVR or SMS very effectively.

Third party service providers were informed in advance of the pending event and all planned IT work was suspended. As discussed above, the different telephony platforms between SSEPD's two call centres may have created unexpected issues with operating the two DCCs as a seamless entity during the Christmas period.

6.6 Resourcing

The two SSEPD licensed areas each have a customer contact centre; SSEH located in Perth and SSES in Portsmouth. The north and south customers have separate telephone numbers but the contact centres are intended to operate as a virtual single contact centre with call flows between the two if required. Additional overflow facilities are normally provided by the SSEPD's supply business that has call centres at Basingstoke, Cardiff, Perth, and Portsmouth. These latter facilities enable SSEPD to increase the number of call advisors to more than 130.

Comprehensive training of teams at the call centres takes place twice a year by in-house trainers and, during periods when the overflow facility is required, experienced SSEPD staff are present on-site to provide additional support.

6.7 CTI platform effectiveness

The review has shown that SSEPD's CTI systems and communication networks provide a secure and flexible platform for supporting the contact centres and overflow facilities. The call handling and message systems have the capacity to handle large volumes of telephone traffic.

However the deployment of the STORM® platform in SSES earlier in December does give rise to concerns regarding introducing a new system and associated procedures during a period when there is a high likelihood of emergency events occurring and, with high call volumes, stress test the system in a live environment.

No issues affecting the operation of internal or service providers' CTI systems and communications networks were experienced during the Christmas period.

Call handling and messaging

Call advisor staffing effectiveness

Whilst SSEPD's two call centres generally operate as a virtual single entity, the problems caused by the disparity in telephony platforms over the Christmas period have led to separate considerations of the effectiveness of each. To assess of the adequacy of the advisor staffing the following measures were considered:

- The abandonment rate;
- Wait-time; the mean time taken for response by an advisor; and
- The number of advisors answering calls.

Answering customer calls

Answering all customers' calls by call advisors, with a reasonable answer time, depends upon matching the number of advisors to the call volume, which is highly volatile, with significant and sudden peaks in the event of a system incident. In the situation of the volume of incoming calls exceeding the number of free advisors calls will be queued and there will be a wait-time before the call is answered. The

availability of an advisor becoming free is dependent on the duration of the call and any associated process work, such as updating the company's incident database.

The customer has the option to abandon the call at any time while waiting; the longer the wait the more likely the call will be abandoned. Based on an acceptable wait-time[23] the abandonment rate (AR) is often used as a service measure, the target being appropriate to the service offered. In the case of emergency lines a very low abandonment rate must be targeted.

The abandonment rate is the ratio of the number of abandoned calls to the total number of queued calls. The abandonment rate is not just dependent upon answer time; type of call, time of day, caller tolerance, and availability of alternatives may all be factors.

SSEH

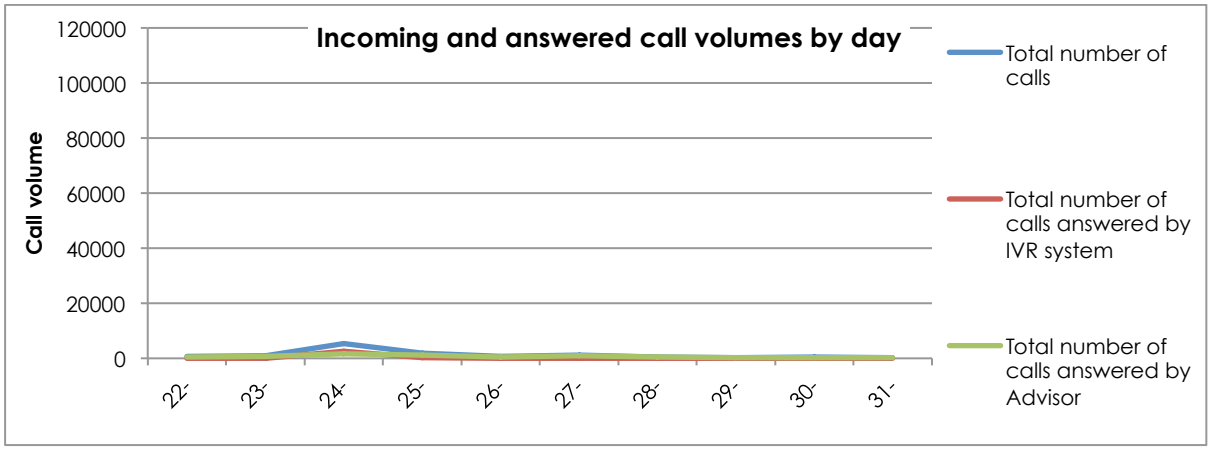


Chart 1 – Association between incoming and answered calls SSEH (Perth)

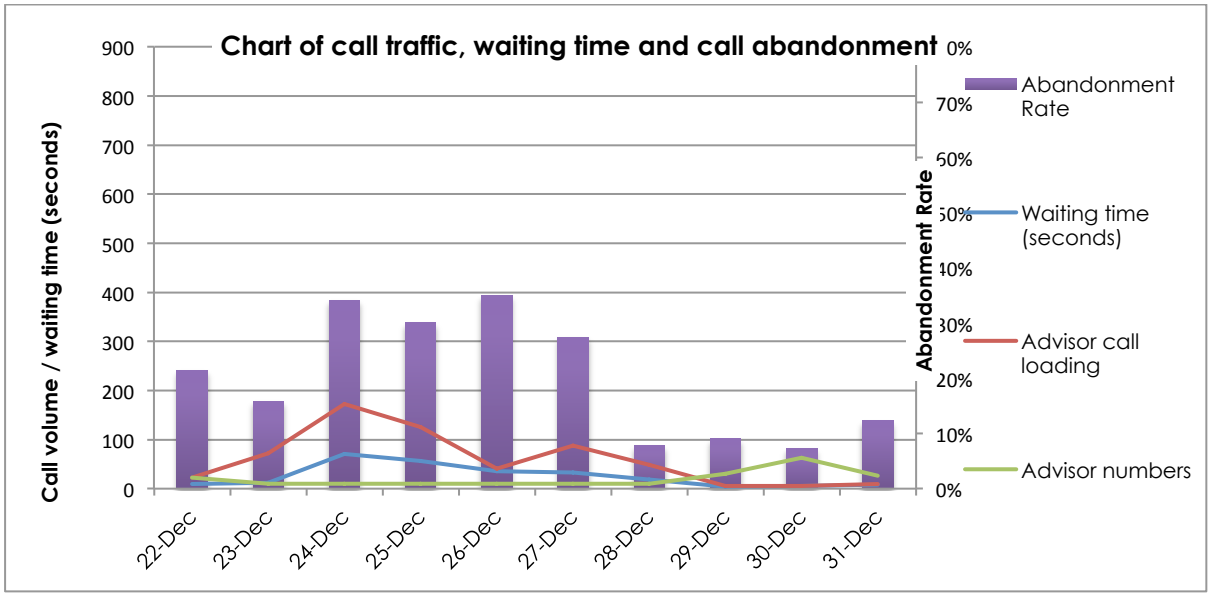


Chart 2 – Association of factors to abandoned calls – SSEH (Perth)

[23] Variable under the control of the Contact Centre

KM1	5298		KM2/KM1	50%
KM2	2670		KM3/KM1	33%
KM3	1727		KM5/KM1	17%
KM5	892		Total	100%

Table 1 – SSEH Peak total call volumes - 24 December 2013

During the Christmas period the telephony platform in Perth was still provided by the Avaya / ACD system and comparatively little call volume was experience during the Christmas period.

Observations

Over the peak-day the majority of the calls were answered by the IVR. The abandonment rate is very high (34%) and with only 10 call advisors it is likely that, although the average waiting time was 71 seconds, there would have been some periods when the waiting was much longer. The reverse of this situation can be seen around 30 December when staffing level was at 63.

SSES

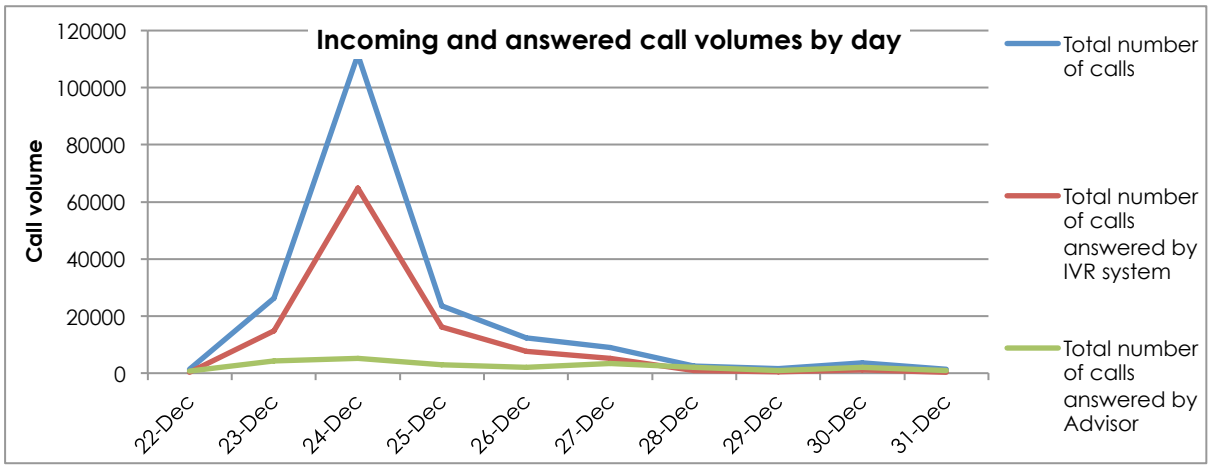


Chart 3 – Association between incoming and answered calls SSES (Portsmouth)

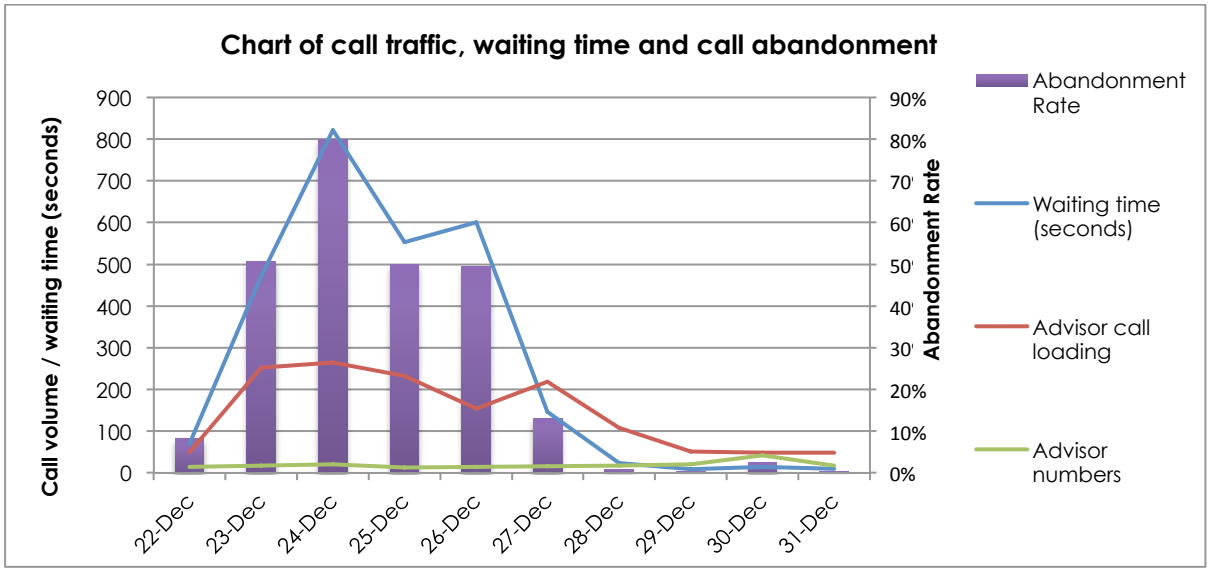


Chart 4 – Association of factors to abandoned calls – SSES (Portsmouth)

KM1	111,373		KM2/KM1	58%
KM2	64,844		KM3/KM1	5%
KM3	5,279		KM5/KM1	19%
KM5	21,125		Total	82%

Table 2 – SSES Peak total call volumes – 24 December 2013

During the Christmas period the SSES telephony platform was provided by the Vodaphone STORM® system.

Observations

- 58% of the calls were answered by the IVR but only 5% answered by Advisors, with unsuccessful calls at 19%; and
- The low level of staffing throughout the period was a major factor in the high abandonment rates and extended answer times.

Table 2 – SSES Peak total call volumes – 24 December 2013

During the Christmas period the SSES telephony platform was provided by the Vodaphone STORM® system.

7 Internal review, evaluation and follow up

7.1 In-house reviews

SSEPD reviewed its performance after the 5/6 December storms and its emergency response. SSEPD conducted a full review of events and submitted data to both the Ofgem stage 1 and DECC reviews, together with a follow-up report on 1 May 2014 to Ofgem.

7.2 Network condition and resilience

Technical standards are set out in the company's planning documents and are generally compliant with ENATS standards as applicable to their location. ENATS 43-30, and 43-40 for construction standards and ENATS 43-8 and ETR132 for management of trees and vegetation (key causes of incidents) are implemented across SSEPD.

SSPED's distribution networks are designed to ENA standards though, like others, it has legacy networks inherited from the two quite diverse licensed areas that make up the current DNO. SSEH does have a number of derogations from compliance with planning standards in Scotland due to a combination of the terrain and associated cost of putting in alternative feeders to comply with Engineering Recommendation P2/6.

SSEPD has been a leader in the installation of networks more resilient to severe weather conditions, particularly in the south, for example SEPD was a leader in the installation of BLX conductor on 11kV lines (approximately one third is now BLX) and has made extensive use of aerial bundled conductor (ABC) on low voltage lines. These systems add significantly increased resilience to more frequently encountered levels of severe weather and do increase resilience and tolerance of trees and vegetation. However, when they are brought down by falling trees as a result of the combined extremes of saturated ground, high wind gust speeds and gale force winds over a sustained period, they are more difficult, costly and time-consuming to repair.

In common with all DNOs, SSEPD is also improving its network reliability by carrying out overhead line refurbishment and replacing ageing plant and equipment.

7.3 Learning from others

Along with other DNOs, the company is participating in delivering the DECC action plans and taking forward actions which will enhance and recover its normal capability and customer service delivery.

SSEPD has stated its enthusiasm to learn how others achieve some of the impressive results that have been reported.

Many of the facts speak for themselves. In the south of England, customers without electricity for more than 120 hours, combined with excessively long answer times for customer calls leading to a high rate of abandoned calls are not features of SSEPD's usual high standards.

SSEPD, along with SPEN, was commended by letter and by a statement in the Scottish Parliament by the Scottish Government's Minister for Energy, Enterprise and Tourism, Fergus Ewing MSP for the service provided to Scottish customers.

SSEPD operates its two networks as one business and can be expected, due to derogations of standards within the vast area in Scotland, if anything, higher levels of reliability and service in the south.

8 Review of performance against success factors

Ref	Activity	Review of SSEPD's Performance
SF1	Emergency plans and advance preparation	❑ SSEPD operates its two non-contiguous licensed areas a single organisation with support capability between the two. It therefore has a single set of emergency plans. ❑ SSEPD has robust plans in place covering all aspects of an emergency event. These plans were externally reviewed as far back as 2002 and have been modified based on event experience and to allow for technological developments on regular basis since then. ❑ In May 2014 under this review the plans were found to be robust and fit for purpose.
SF2	Weather forecasts, prediction of impact and resource requirements	❑ SSEPD uses the MeteoGroup to provide its forecasts on a daily basis. These include detailed forecasts for the immediate 4 days ahead and a more general overview for the following 6 days. In addition, SSEPD has two in-house weather forecasters who provide longer-term forecasts and review the externally provided short-term forecasts. ❑ The MeteoGroup predicted that due to the change in direction of the Jet Stream there would be a period of very unsettled weather across the UK. ❑ Weather forecasts are circulated to all SSEPD's operational managers.
SF3	Early reaction and mobilisation	❑ SSEPD started its mobilisation on 18 December in its efforts to be ready for the impact of the weather predicted over the following few days. ❑ In accordance with emergency plans a Power Distribution Alert Team was established, consisting of six senior staff representing all areas of the business, ready to take strategic decisions for executing the emergency plans. ❑ SSEPD increased its staffing levels for field staff working on emergency repairs from 95 to 440 and for call advisors and support staff from 35 to 106
SF4	System automation to restore bulk customer numbers	❑ SSEPD has invested in system automation and has almost completed its overhead line programme. In SSES the underground network automation is approximately 50% complete, in the north it is considered unlikely to be cost effective other than in the cities of Aberdeen and Dundee. ❑ The storms hit the SSES network on 23 December and the SSEH network on 24 December.

Ref	Activity	Review of SSEPD's Performance
		❑ Supplies were restored to over 50% of SSEH customers within 1 hour of the storms hitting. In SSES, which has a greater degree of automation this was reduced to 33% restoration in the first hour due to a high incidence of faults in a compact area to the east of the SSES area affecting alternative supplies and backfeeds.
SF5	Telephone response & answering service.	❑ SSEPD normally has a dedicated call centre staff of 147 with up to 25 call advisors available to receive supply interruption calls with a further 7 on standby out of hours if required. ❑ SSEPD relies upon the four supply business call centres owned by its parent group for emergency overflow. These were not available to SSEPD over the Christmas period. ❑ When customers call SSEPD they are requested to select one of 3 options; dangerous situation / power failure / general. The dangerous situation option is routed direct to an advisor as a priority call, the power failure option to an advisor if available or a recorded message and then to a queue if the caller still wishes to wait to speak to an advisor. ❑ SSEPD now uses the STORM® messaging system to support its call advisors with recorded messages during an emergency. The STORM® system links direct to SSEPD's network management systems and, if the customer is calling from a recognised line, the call can be directed to information relating specifically to the customer's 6 character post code if it is affected by a supply interruption. ❑ In December 2013 SSEPD had installed STORM® in Portsmouth but not in Perth. From the call-taking statistics for average answer time (peaking at 71 seconds in Perth on Christmas Eve and 821 seconds in Portsmouth) it is evident that the normal backup between the two call centres was not available, leaving customers in the south, where there was a peak of calls, poorly served. ❑ SSEPD recognises that it had insufficient call advisors available over the Christmas period and is training a further 100 in-house staff to increase availability.
SF6	Gathering field information	❑ SSEPD supports and supplements information received from its incoming telephone calls with scouts as a means of gathering more informed information regarding network damage, team size and materials required to carry out repair and number of customers expected to be restored by the repair. This saves valuable time for the critical overhead line repair teams who can progress from

Ref	Activity	Review of SSEPD's Performance
		one fault repair to the next with some confidence that they have the right materials available and know of any support that is required in terms of special equipment or transport and safety documents. ❑ Wherever possible SSEPD pairs the scout with someone who is Competent under its Safety Rules to isolate and make safe supplies where a dangerous situation may exist.
SF7	Processing Information	❑ In common with most DNOs, SSEPD has invested heavily in technology to support the processing of information from the network, from customers and from staff to provide an overall picture of the damage to its networks, the likely work required to carry-out repairs and estimate restoration times. The volume of information to be processed is massive and all DNOs are significantly better placed to handle this than they were 10 years ago. ❑ Technology is developing and changing rapidly and there is always likely to be one DNO having a slightly later version of a system than another, or using features differently to link in with other in-house legacy systems. ❑ SSEPD uses the STORM® telephony system, GE ENMAC® (converting to Power On Fusion) network management system and its in-house SIMS system for incident management and dispatch. All of the systems are linked to ensure network data is available to call advisors, and incoming call data automatically links to network data where call line identifier is available.
SF8	Rapid dispatch of switching resource to site	❑ SSEPD has rapid response teams (usually single person) authorised to carry-out high voltage switching to the instructions of the system control engineer. Using the information from its systems described under SF7 it is able to dispatch resources quickly and efficiently to switching points on the network to deliver maximum benefit to customer restoration. ❑ SSEPD's rapid response teams are equipped with electronic navigational aids also marked up with switch locations to avoid time loss in locating switching points in rural areas.
SF9	Ensure adequate resources in terms of people, transport materials	❑ SSEPD carries out a winter readiness review every autumn to ensure its facilities are ready and adequate with the ability to invoke its emergency plans as and when they are required. This review extends to people and contact details, transport availability, stock levels of critical materials and any other bought-in services.

Ref	Activity	Review of SSEPD's Performance
		❑ The winter readiness review is carried out in every office, depot and service centre and is signed off by the Head of Operations (North or South as appropriate) when complete. ❑ When an escalation to emergency status is invoked the Power Distribution Alert Team constantly monitors availability and deployment of all resources and takes strategic level decisions on movement of staff, reallocation of resources, movement of generators and the like.
SF10	Adequate overhead line staff	❑ SSEPD holds two distribution network licences, both of which have significant overhead line networks, amounting to 21% of the country's overhead lines. ❑ SSEPD has below average ratio of linesmen to km of overhead line, with 63km of overhead line per member of overhead line staff. ❑ SSEPD operates a mixed in-house / contractor policy for overhead line staff; employing 17% of the country's directly employed line staff and 33% of contract staff, amounting to 20% of the country's total overhead line resource. The contract staff are heavily biased in the south. ❑ Other than in the unlikely event of both distribution networks being simultaneously severely affected by adverse weather SSEPD is therefore well placed to move staff between licensed areas without external reference, but does have major travel distance and times to take into account. ❑ SSED contractors in the south had stood down for Christmas the week before the storms arrived and were not all available to be recalled. SSEPD is reviewing its arrangement with contractors for holiday cover.
SF11	Management of repairs	❑ SSEPD prioritises repairs to achieve maximum number of customers' supplies restored in the shortest possible time after restoration that can be achieved by switching is complete. ❑ This generally takes the order of highest voltage faults impacting supplies first, working down through voltage levels, followed by restoration of strategic duplicate circuits that have faulted and impose a system risk but are currently not affecting customer supplies.
SF12	Manage the event tail	❑ SSEPD's restoration of the tail (the 5195 -2.6% of those affected- customers remaining without electricity after 48 hours) took longer than might have been expected. While contributory factors included masked faults, and impaired travel, SSEPD acknowledges that more staff and an earlier deployment of mobile generators could have

Ref	Activity	Review of SSEPD's Performance
		improved the situation.
SF13	Mobile Generation	❑ As in SF12, SSEPD acknowledges the need for earlier and more effective deployment of mobile generation and has plans in place to make greater use of non-overhead line staff to operate independent of the network restoration teams to address identified incidents likely to take longer to repair and to deploy generators early.
SF14	Use of all media channels to communicate with customers	❑ SSEPD uses multiple media channels to communicate with its customers; in addition to telephone communication and voice messages it uses text messages, and social media including Facebook and Twitter. ❑ SSEPD uses a dedicated team to operate its Facebook and Twitter channels using the same information that is presented to call advisors from the linked information systems to ensure consistency of messages.
SF15	Provide realistic estimates of repair duration and informing customers	❑ All DNOs, recognise the need to give the most accurate estimates of restoration times that they can. Over-optimistic repair times tend to antagonise customers, particularly when not updated and restoration times are not achieved. Equally, unduly pessimistic times are not helpful to customers as there are likely to be instances of customers making alternative arrangements only to find the supply is restored soon after leaving home or incurring expense. ❑ Customers are frequently surprised that, after waiting for several hours for information about their predicted restoration and the DNO not having an answer, that the repairs are ultimately carried out in a matter of minutes from arrival on site. This is the reality of some types of incident. ❑ All DNOs are considered to have performed as well as was achievable in this respect. The process is under review, arising from action C9 of the DECC review.
SF16	Provide feedback to customers with regular updates	❑ Through the linked systems of ENMAC/POF®, SIMS and STORM® and feedback from staff in the field SSEPD provides messages to its customers with the same information a call advisor would have available. This is updated with new information each time there is a change of status on repair work. ❑ If there is no change of status the messages are updated on a 3 hourly basis with a latest update time.
SF17	Local presence and community	❑ SSEPD used village halls and other public buildings as contact centres in longest affected areas, to

Ref	Activity	Review of SSEPD's Performance
	contacts	gather further incoming information. ❑ SSEPD has taken on additional headcount staff to act as customer and community advisors who will be active in communities in future emergency
SF18	Provide adequate welfare facilities to PSR customers from start of event and to all customers who are without supply for more than 48 hours	❑ SSEPD has 270,000 PSR customers, who are provided with a dedicated telephone number. ❑ SSEPD made a point of identifying suitable public houses and connected generators to enable meals and drinks to be provided to customers. ❑ SSEPD has contractual arrangements in place with "Haste", a commercial provider of mobile catering and also has its own mobile catering vehicles coming into service to support communities that have been without supply for an extended period. ❑ The main purpose of the vehicles is to provide hot drinks and hot meals to people (SSEPD estimates that 23,500 hot meals and 40,000 hot drinks were provided to its customers) but also able to provide charging facilities for mobile phones, provide torches and foil blankest to vulnerable people. ❑ SSEPD has received positive customer feedback regarding the level of service and support it provided to customers. ❑ SSEPD increased Guaranteed Standards of service payments to customers who were without supply for more than 48 hours and made ex-gratia payments of £75 to any customer who was without a supply of electricity on Christmas day, whatever the duration. ❑ SSEPD, in common with most DNOs, has arrangements with the British Red Cross to provide additional support to vulnerable customers in their homes while they are without supply. ❑ SSEPD has received a formal letter of recognition for the service it provided to its customers during the Christmas period from Fergus Ewing MSP.

Appendix 5 UK Power Networks (UKPN)

1 Summary

UKPN suffered one of the most sustained period severe weather events in recent years, resulting in 1,066 network incidents, interrupting electricity supplies to 230,859 customers on its south eastern network. 9,635 customers were without supply for more than 48 hours, the worst case being 154 hours.

UKPN's telephony system is focused on a main call centre and is available to staff across the company and to its outsourced provider of overflow support 'Ansaback'.

Following the October 2013 event UKPN brought forward the implementation of the new telephony system, STORM®. STORM® appears to have worked well over the severe weather period between 23 and 28 December and enabled UKPN to provide its customer information to 345 concurrent users in its offices on Christmas Eve, its peak activity period. In spite of this number of call takers, reported answer times became very high (over 9 minutes) and abandoned call rates escalated to 60% on Christmas Eve. This is likely to have been for two interrelated reasons: many of the incidents occurred overnight on 23/24 December, resulting in a sharp peak as people woke up without electricity, as evidenced by the peak of calls recorded on the telephony system together with a natural anxiety about whether supply would be restored for Christmas Day. During the morning peak on 24 December the calls presented amounted to 35% of the week's total and abandonment reached a rate of 140 to 160 calls per minute between 08:00 and 09:00. 'Ansaback' provided support over the Christmas period.

UKPN operates 17% of the country's networks and in total employs 10% of the skilled overhead line strength, with significant dependence on contractors. It was unable to move staff between its EPN and SPN licenced areas until the third day of the exceptional event as both were suffering weather-related incidents.

UKPN appears to employ, or to contract, sufficient overhead line staff for normal business but was unable to access sufficient resource to meet this scale of event, which affected its two licensed areas which have significant overhead lines. The mutual aid arrangement, NEWSAC, did not deliver the additional resource until after the Christmas public holidays.

2 The company

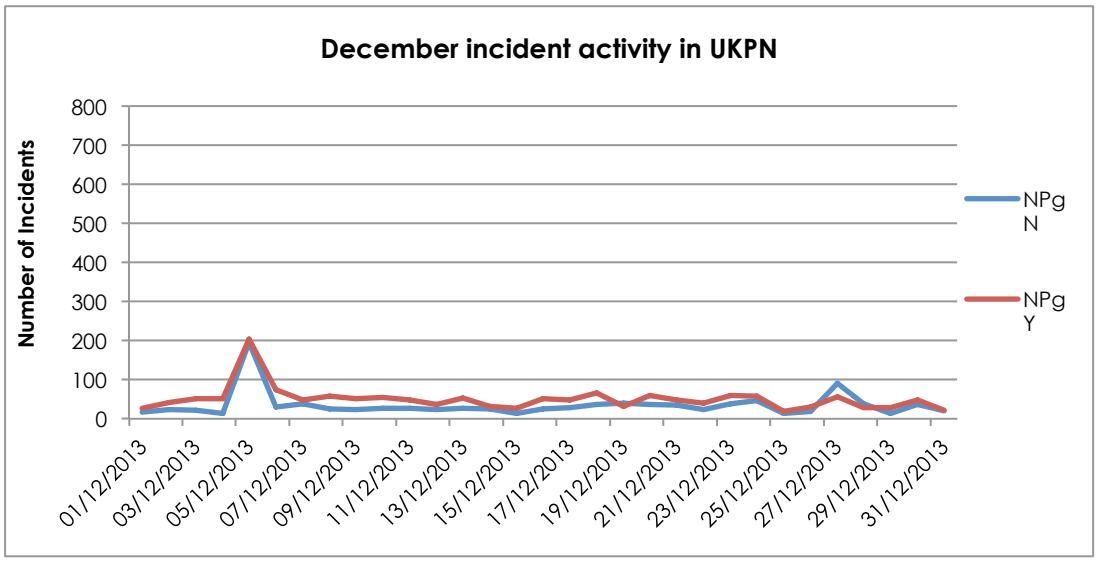
UK Power Networks (UKPN) is the electricity DNO for the East of England, London and the South East, delivering electricity to over 7.8 million customers across a service area of 29,165 square kilometres.

UKPN owns three electricity distribution licences: Eastern Power Networks (EPN), London Power Networks (LPN) and South Eastern Power Networks (SPN).

UKPN's three distribution networks consist of 170,000 km of overhead lines and underground cables, together with 130,000 substations. The DNO employs 5000 staff.

3 The event

3.1 December incident activity



3.2 Scale of the Christmas event

For the Christmas storm, UKPN (EPN) was first impacted on 23 December with the event profile below:

Number of short Interruptions (< 3mins)	48,973
Number of higher-voltage incidents	205
Total number of incidents	850
Number of Customers losing supply (3mins and over)	88,002
Number restored within 1 hour	50,340 (57.2%)
Number restored within 24 hours	87,634 (99.6%)
Number restored within 48 hours	87,975 (99.8%)
Number without supply > 48 hours	27
Customer longest without supply	77 hours

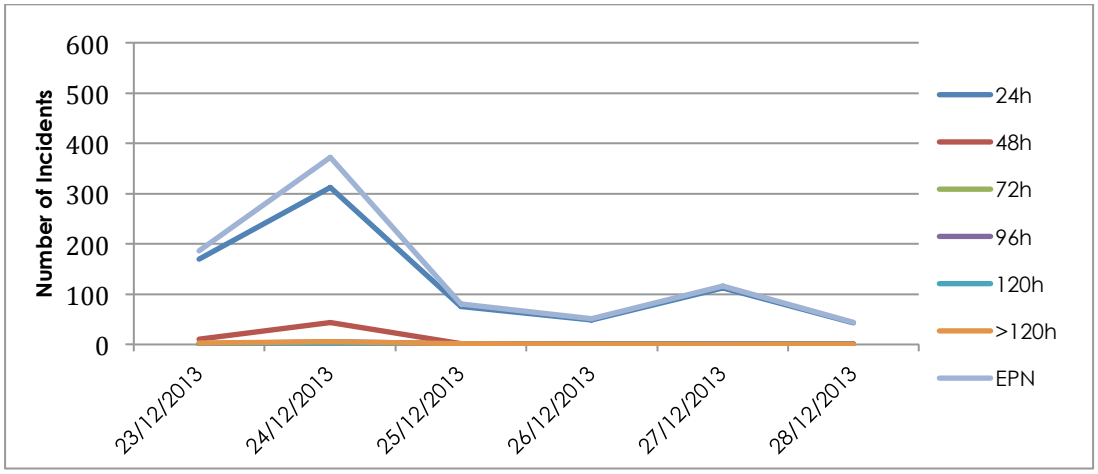
For the Christmas storm, UKPN (SPN) was first impacted on 23 December with the event profile below:

Number of short Interruptions (< 3mins)	102,171
Number of higher-voltage incidents	339
Total number of incidents	1,079
Number of Customers losing supply (3mins and over)	230,859
Number restored within 1 hour	122,221 (52.9%)
Number restored within 24 hours	206,135 (89.3%)
Number restored within 48 hours	221,224 (95.8%)
Number without supply > 48 hours	9,635 (4.2%)
Customer longest without supply	154 hours

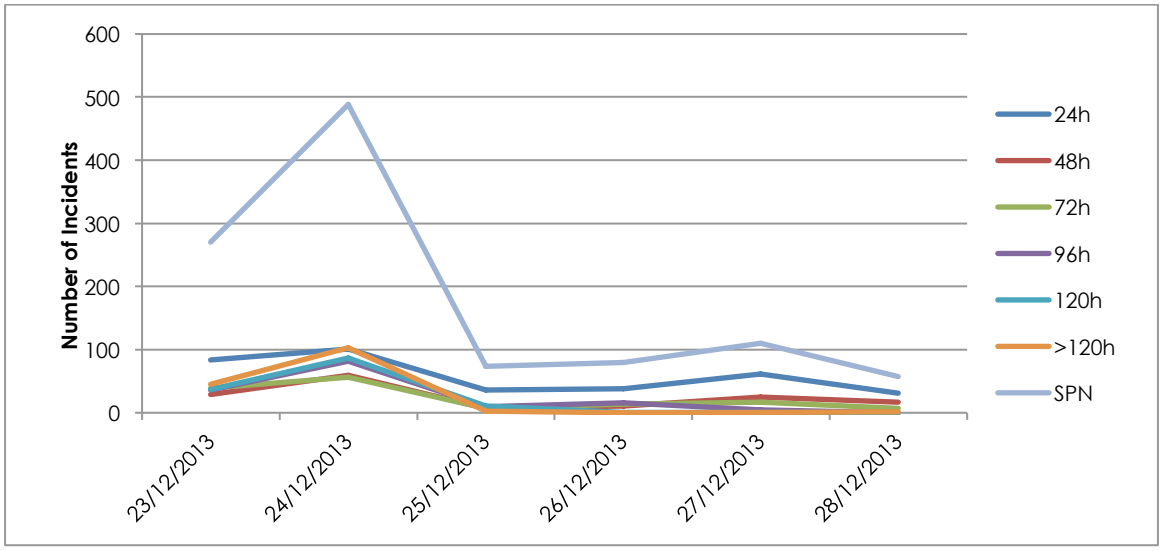
3.3

3.4 Incidents per day with repair periods by licensed area

EPN



SPN



3.5 Customers interrupted (3mins and over) and restoration times

4 Planning and preparedness

4.1 In house plans and procedures

UKPN has well defined plans and procedures that are invoked whenever it receives a warning of severe weather likely to affect its geographical area. UKPN carries out an annual system emergency exercise to test its plans and procedures, though cannot fully stress test for availability of staff. UKPN identifies 10 separate instances where it has carried-out various exercises and training sessions between February 2012 and September 2013.

UKPN states that there were no significant changes to its plans and procedures resulting from these exercises and it considers itself well prepared when the storms of October 2013 impacted its distribution networks and tested its plans and procedures 'for real'. The company views its emergency response as an escalation of its 'business as usual' activities and not something different that it needs to do in these circumstances – the emphasis is on 'more of the same' in terms of supply restoration.

Dependent upon the severity of the forecasted weather, UKPN ramps up its activities in readiness. Over the years, UKPN has developed a modelling tool whereby it endeavours to predict the effects the severe weather is likely to have upon its distribution networks. Under its emergency procedures, UKPN uses the outputs from its modelling to determine its approach to ramping-up in readiness for tackling the effects of the forecasted weather. Again, dependent upon the predicted severity and its likely longevity, UKPN will take action to place more staff on standby and / or bring more staff into its operational depots (particularly linesmen and Senior-Authorised Persons), call-centres, control room, dispatch centres and stores.

UKPN will also establish its: incident management team (whose role is to steer the whole event); operational strategic team (whose role is to co-ordinate operational activity and customer service); regional tactical teams (whose role is to co-ordinate emergency response); and local emergency resource centres (whose role is to manage resources). Other checks include: emergency stores and replenishment arrangements; contractor availability and, where appropriate, the mutual aid arrangements.

UKPN, along with all DNOs uses sophisticated computerised systems to record incidents on its distribution networks and other matters requiring its attention, such as reports of damaged substation doors. It is essential that people who are asked to talk to customers have ready access to the incident database (also called trouble-call system) so that they can either enter new information or relate existing information to customers. All people on whom UKPN relies to answer telephone calls from its customers have access to its trouble-call system, are trained in its use, understand how to interpret the information therein, how to relate this information in every-day terms and how to glean and to record essential information that an incoming call may provide for the first time.

UKPN has established an incident trouble-call system that is web-based and which can therefore be used by people with access to a reliable internet link and who have the necessary permissions. This includes its operational managers who get an instant alert to new incidents via their mobile 'smart-phones'.

UKPN's main customer call centre is co-located at its control centre. It has an interactive, always on line, arrangement with a nearby external provider, 'Ansaback' where staff are trained in the use of UKPN's incident database and receive regular refresher training. UKPN's agreement with 'Ansaback' provides for a base number of 'Ansaback' call takers. There is a reserve pool of staff who will be added to this number if and when the need arises, such as in a system emergency. During system emergencies UKPN also bases two supervisors in 'Ansaback's' call-centre to provide any immediate support that may be required.

In addition, UKPN has a number of emergency call centres where local staff, can be called on to take customer telephone calls. These emergency call centres can be brought on-stream quickly and, once the staff there are logged on to the incident management system, they are able to work efficiently and effectively to take customer calls. UKPN is also trialling home-based customer call taking. When developed, this approach will cater for occasions when mobility is impeded such as times of flooding or otherwise blocked roads.

UKPN is pro-active in making outgoing calls to its customers. For example, calls made to a customer to check that supplies have been restored following the return to service of a faulted feeder. This can often reveal hitherto 'hidden' or 'nested' faults, such as an overhead service line down or a second fault on a main line or a fault on a spur line.

Within its main call centre, UKPN has a dedicated team of people who operate its discrete telephone number published for use by its customers listed on its priority service register (PSR) and those otherwise identified as vulnerable. This team also operates UKPN's pro-active communication approach towards these customers, checking on their needs and advising them of supply restorations as appropriate.

In addition to the handling of telephone traffic, UKPN has a dedicated team of people in its main call centre who use using social media (Facebook and Twitter). UKPN provides its social media service 24 hours, the first DNO to do so.

UKPN has completed a review of the queuing times and flexibility of its contact centre resourcing arrangements following the December event[24].

4.2 Weather forecasting

UKPN relies on the weather forecast provided by the Met Office. UKPN considers that the Met Office provides a good service and that its forecasts are generally accurate. The company cited the forecasts of the 'St Jude's Day' storm (28

[24] This is explained in the DECC review, see paragraph 1.6 and action point R4 attributed to UKPN.

October 2013) and that of the early December (5/6 December 2013) as examples of accuracy.

Regarding the later December storms, however, UKPN reported that the bad weather which was forecast to hit its area on 18 December did not happen and, having stood up its people in readiness, stood them down again. UKPN was disappointed in the lack of accuracy in the forecasts it received between Friday 20 and the morning of Sunday 22 December 2013. For this period, the early Met Office forecasts indicated that strong winds would affect UKPN's geographical area during the weekend. On Saturday 21 December 2013, the forecast worsened to indicate storm force winds would affect the SPN area during the Christmas period, but not the EPN licensed area. Consequently, UKPN considered that it would be able to cope with its in-house prediction of system incidents by moving staff into its SPN licensed area from its EPN licensed area and without recourse to requesting external help via NEWSAC. However, the situation worsened when the EPN licensed area was also included in the storm forecast that UKPN received from the Met Office on Sunday 22 December 2013, whereupon UKPN declared a full 'System Emergency'.

As can be seen, the Met Office forecasts predicted that the weather would get progressively more severe over the weekend before Christmas. Upon the receipt of the worsened forecast on Sunday 22 December 2013, UKPN made a request for assistance via NEWSAC, it being the only DNO to do so. At that time no other DNO was able to release any resources as they needed them to respond to any incidents that the predicted storms may have on their own networks.

The forecasts that UKPN received at 08:30 and at 11:00 on Monday 23 December 2014 predicted still further increases in the strength of the storm force winds. Anecdotal evidence indicates that, at the time UKPN made its request to NEWSAC, other UK DNOs had received the severest weather warning from the MeteoGroup some time in advance of UKPN's from the Met Office and they were therefore 'ahead' of UKPN in terms of readiness. The sharing of early warning forecasts between DNOs has been agreed as a learning point as part of the DECC review.

In response to the series of progressively worsening weather forecasts, UKPN invoked its emergency procedures establishing its incident management team, its operational strategic team, its regional tactical teams and its local emergency resource centres.

UKPN's post-event reviews included obtaining Met Office information on where the most severe wind gusts occurred. For the Christmas period this shows that wind gusts greater than 60 mph occurred well inland across the UK and that wind gusts greater than 70 mph occurred over the SPN geographical area as far inland as the Croydon area, with coastal areas experiencing gusts of 75 mph. The Met Office data also confirmed that gusts greater than 79 mph affected the coastal areas of UKPN, SSES and WPD. The strength and disposition of the above wind gusts caused more damage to SPN's distribution network in the more wooded and populated inland areas as opposed to the less-densely populated coastal regions.

Moreover, a second period of severe weather affected UKPN's area between 27 and 29 December 2013, causing further damage to its EPN and its SPN distribution networks.

5 Response and restoration

5.1 Impact

5 and 6 December 2013

Both UKPN's EPN and SPN distribution networks were affected by the severe weather of early December 2013. For the EPN licensed area this resulted in a 'Category 1'

severe weather exceptional event. It also necessitated UKPN having to respond to the tidal surge, which affected the east coast. The effects of this storm on UKPN's SPN network were less than in the EPN licensed area. UKPN did not need to call upon external resource to effect repairs. UKPN confirms that both distribution networks were restored to normal before the onset of the severe weather later in December 2013. The effects of this storm were more severe on other DNOs resulting in them calling on NEWSAC resources. In response UKPN provided 24 overhead linesmen to Northern Powergrid on 6 December 2013.

UKPN states that there were no additional learning points identified during its post-event review of the early storms of December 2013.

23 to 29 December 2013

This storm started to affect UKPN's networks during the morning of Monday 23 December 2013, only hours after it received the severest (and retrospectively most accurate) forecast from the Met Office. Incident data shows that, hourly, the number of new high-voltage incidents rose throughout that day and into the early hours of 24 December, peaking at around 01:00.

UKPN's previous experience is that storms normally last for between 12 and 20 hours before 'moving on'; whereas UKPN reports that this storm lingered 35 hours continuing to cause incidents up to late on Christmas Eve. The gale force winds made it unsafe for linesmen to climb during this period, further compounded by a forecast of lightning on Christmas Day - again causing safety related delays to repairs.

Travel was difficult. The A20, A25, A26, A225 and A229 trunk roads were blocked due to either fallen trees or flooding: Many B-roads and minor routes were impassable. The area was affected by a further severe weather front during 27 and 28 December 2013, while the company was still completing repairs from the Christmas Eve / Christmas Day storm, further hampering its restoration work and causing new incidents. The accurate forecast of this later storm prevented any other DNO being able to release resources to assist UKPN's restoration work. It was not until Thursday 26 December 2013 that NPG was able to release 22 linesmen to help UKPN with its repair work

For the SPN licensed area the incidents caused by the Christmas storm passed the threshold for a 'Category 1' severe weather exceptional event at 16:00 on Monday 23 December and the threshold for a "Category 2" event just three hours later. The cumulative number of high-voltage faults on its SPN network reached the 1-in-20-year threshold just over 24 hours after the first effects of the storm were felt.

UKPN called upon assistance from helicopter providers to patrol its overhead line feeders. On 24 December 2013, two machines from 'Airborne Solutions' flew UKPN's 33kV and 11kV networks and, on 28 December 2013, the WPD consortium provided a helicopter to patrol more of UKPN's 33kV network.

5.2 Restoration strategy

UKPN prioritises attendance to safety calls over customer restoration, irrespective of system voltage. For example, this approach applies to reports it receives of low or grounded conductors for both LV and HV damage. Beyond that, in common with all DNOs, UKPN has invested in the installation of automation and tele-controlled facilities on its high-voltage feeders. This enables the rapid restoration of sections of a faulted feeder before staff arrive on site to carry-out manual switching to localise the affected section of a feeder and further restore interrupted supplies to customers.

In its approach to restoring customers' supplies, UKPN, like other DNOs will generally begin restoration of supplies at the highest voltage level. Exceptions to this principle

would be if access difficulties, such as blocked roads, prevented staff from reaching parts of a DNO's network.

This approach ensures that the greatest number of customers' supplies are restored as early as possible during the restoration process.

Where extensive storm damage is concerned there are often multiple faults on a single high-voltage circuit and its spur lines and these may not be revealed until the first known incident is repaired and the circuit can either be energised up the next fault down-line or it fails to re-energise at source. In either case, further investigation is needed to identify the next point of failure and repairs must be made before that section of a feeder, or the feeder from source, can be restored to service. This restoration strategy generally continues until all the higher voltage incidents are found and the feeders fully re-energised. Thus, working 'down' the voltage levels, usually enables a DNO to restore the maximum number of customers in the shortest possible time.

Once a high-voltage feeder is restored, or partially restored, it is likely that 'hidden' or 'nested' faults will exist on the low-voltage system, including overhead service lines. As discussed earlier, when a DNO believes it has restored supply to a customer, or a group of customers, DNOs are pro-active in contacting those customers to determine whether or not supply has actually been restored. Where the customer reports they are still off-supply and this is the first indication to the DNO that at least one further fault exists, the DNO raises a new incident report to ensure that the situation is captured in its management and reporting database, via the afore-mentioned 'trouble call computer system. These 'hidden' or 'nested' faults are then programmed for repair via the DNO's incident management system.

In terms of its restoration strategy, UKPN had an approach, which had served it well on previous occasions and appeared to be appropriate to this event.

5.3 Effectiveness

Much of the south of England is, in comparative terms, densely populated and tree covered. SPN reports that of the 100 incidents it has examined, only 3 were caused by growing trees within its cut swathe. In the other 97 cases there is no indication that UKPN's tree-clearance policy had any influence on their occurrence. There were instances where trees had either fallen across roads onto UKPN's overhead lines or had fallen into them from adjacent land not in the ownership of the wayleave granter on whose land UKPN's line stands.

The severity of the conditions can be gauged from the fact that mature deciduous trees separated by up to 8 metres from UKPN's overhead lines were the cause of several high-voltage incidents when they were toppled by the strength of the wind. SPN cites a typical example, which occurred near Guildford where the trunk of a poplar tree, 5 metres away from its high-voltage line, was snapped off and the upper section fell into SPN's overhead line.

Since the St Jude's Day storm UKPN has continued to improve the reliability of its network automation. It had already doubled the number of people on standby (UKPN took this decision in November 2013). Excluding the Bank Holidays, UKPN had already reduced the number of people who could take holiday to 25% from its 'usual' 50%; asked people to cancel their holidays; placed its contractors on standby; and cancelled all but essential customer-affected programmed work. As soon as it was able to release staff working to restore supplies in its EPN licensed area, UKPN moved them to bolster the work to restore supplies in SPN.

UKPN reports that 10,341 of its customers were affected by the 42 incidents due to flooding; and that safety issues necessitated 34 high-voltage incidents (safety disconnections), affecting 7,488 of its customers' supplies.

UKPN deployed mobile generators to accelerate restoration of supplies including those for vulnerable customers. UKPN has its own generators and contracts in place with MEMS and Aggreko to supply generators. Generators were deployed as shown below.

	Mobile generators	
	UKPN owned	**Hired**
EPN	57	51
LPN	17	29
SPN	18	76

UKPN recognises that it could have mobilised generators sooner and is reviewing its approach to mobile generation and may bring more 'in-house'.

In conclusion, the most critical issues from the analysis are that UKPN escalated later than other DNOs, a decision driven by the weather forecasting uncertainty reviewed above. This meant that mobilising staff during the festive week itself, rather than before the weekend, was more difficult. There was little evidence that mobilisation was hampered by poor or unsuitable staff pay and conditions. The company disclosed its payments regime for those working on the statutory holidays and this can only be described as generous.

Ongoing gale force winds and, on Christmas Day, a forecast of lightning in its area both caused delays for reasons of safety. UKPN made good efforts to use the workforce it had available. However, as reviewed in some depth in the main report, UKPN is lightly resourced in a critical resource - overhead line staff - relative to other DNOs. It is also makes considerable use of contractors, which in terms of availability at times of stress and over long public holidays, presents a different risk profile.

The nature of the severe weather event and its trajectory meant that the company was unable to move resources from EPN to SPN (as on other occasions it might expect to be able to do) and also, resources from other DNOs (via NEWSAC) were not available when they were most needed.

6 Keeping customers informed

6.1 Overview

Following a major power supply interruption all DNOs recognise the importance of keeping their customers informed on the progress of restoration and, with large numbers affected, this can only be achieved by the effective use of a telephony platform and associated systems combined with the skills and experience of staff to manage, operate and utilise the various available facilities.

All DNOs have implemented a telephony platform with call handling and messaging facilities; differing only in technical aspects and the level of unification between the various systems that deliver and present the required information. Applying computer telephony integration (CTI) technology, a total unification strategy would provide a complete network to desktop infrastructure, including comprehensive functionality at individual workstations.

In general, the technical aspects of each DNO's telephony platform is adequate and fit for purpose and, other than short-term technical faults, performance can be characterised by the quantity of calls answered within an acceptable time and the availability and quality of messages which satisfy customers' expectations.

The review visit enabled meetings with UKPN staff at all levels directly involved during the Christmas emergency including customer-facing call advisors.

Assessment process

The review of UKPN's telephony platform, the associated computer-based systems and communications networks was conducted at a high-level.

The assessment focused upon UKPN's effectiveness in keeping its customers informed with accurate and timely supply failure and restoration information during the Christmas emergency period. The main areas reviewed covered the acquisition, accessibility and delivery aspects of the information to customers through the telephony platform and other media.

6.2 Planning and preparedness

UKPN undertook exercises from February 2012 (build up to the Olympics) leading up to a system emergency exercise in September 2013 in preparation for the winter.

Prior to the Christmas period, the system emergency plan was implemented twice; first in response to the St. Jude's Storm of 28 October 2013 and then during the severe weather and flooding starting on 5 December 2013.

The deployment of the STORM® call handling platform was accelerated following the St. Jude's event to enhance the call handling and messaging system elements of UKPN's CTI by substantially increasing the number of concurrent calls from 360 to 1,800 and enabling 30,000 simultaneous calls to be processed by the company's IVR messaging system.

Over the Christmas period UKPN's emergency preparedness notice was issued on the 22 December and a system emergency declared on 23 December for its SPN licensed area and on 24 December for its EPN licensed area. Preparations were made on 22 December for increasing the number of call advisors followed by the request for additional 'back-office' staff to act as call advisors from 23 December.

6.3 Acquiring information

Early indications of the potential damage caused by the winds are alerts from the network control centre systems, which continuously monitor the higher voltage networks. Indications of loss of supplies are passed immediately from the control centre systems[25] to the call handling interactive voice response (IVR) facility. The IVR then creates a geographically tailored message available for incoming customer calls.

At low voltage, customers' loss of supply calls are registered automatically by IVR or manually by call advisors into the fault management system, thereby providing additional information to dispatchers and control engineers who may not be aware of a particular fault. The message team verifies the extent of the incident, manually selects an appropriate IVR voice message and texts the same message via SMS to customers who have registered for this service. The same information is also available to the contact centre call advisors who can inform those affected customers who elect to speak to an advisor.

[25] ENMAC™ / PowerOnFusion™

The telephony platform[26] facility for automatically linking customers' telephone numbers[27] with the fault management system is an effective way of making fault information available and reducing the volume of queued calls waiting to be answered.

Key information comes from field teams working on repairs, who may use handheld devices to directly enter and update details; location, nature, impact on public safety and restoration progress updates.

UKPN aims to update any IVR and SMS message within 10 minutes of new information becoming available. This process is monitored on a daily basis to ensure consistency.

UKPN reported there were no issues with the communication systems between field staff and control centre or dispatch during the storm period, although there is always potential for this to become a bottleneck due to the disparity of numbers between field and control centre staff. It also has to be recognised that, in the first hour of an emergency, with the technology now available a control engineer may be more effective in restoring customer supplies by using remote controlled tele-switching than in dealing with more localised operations carried-out in the field.

6.4 Communicating the information

Incident information available to customers is taken directly from the fault management system ensuring that it is as consistent, accurate and as up-to-date as is achievable.

UKPN communicates with customers through the customers' channel of choice; inbound telephony with options for speech contact: IVR speech; SMS messaging; proactive outbound calls; website; Facebook and Twitter.

6.5 Systems and their resilience

The CTI systems provide all system users with the same information so that staff anywhere in the company can access it, including those working from home if required. The main systems used; ENMAC™/PowerOnFusion™, STORM® and Aspect® Unified® ACD[28] are well establish, reliable products. The STORM® platform provides the IVR facility using the Redwood messaging service. Local interconnectivity is provided by duplicated local area networks. Connections to remote key locations and offices are provided by a private wide area network, using secure connections within Cable & Wireless' high capacity, high-speed digital communications network.

The call handling and message systems have the capacity to handle large volumes of telephone traffic and to delivery messages via IVR or SMS very effectively.

Third party service providers were informed in advance of the pending event and all planned IT work was suspended. UKPN reports that there were no issues affecting its CTI systems and associated communications networks during the Christmas period.

[26] Vodaphone STORM®
[27] If registered
[28] Automatic Call Distribution system. A glossary of terms can be found in the main report. Certain technical terms are defined in this document for ease of reference.

6.6 Resourcing

The UKPN contact centre, which handles all calls from its three licensed areas[29] , is co-located with its control centre with a back-up facility at another of its operational sites. 'Ansaback', a third-party call centre located near to UKPN's contact and control centre, provides seamless support, including additional resources during emergency situations.

UKPN has implemented a procedure by which 'Ansaback' call centre staff are trained by UKPN to handle UKPN customer calls. UKPN also monitors 'Ansaback' by visits to observe its agents dealing with UKPN calls and to carry-out quality assurance as well as monitoring performance standards.

UKPN's contact centre has a pool of staff trained to handle business as usual (BAU) and emergency calls from any of its three licensed areas. Over the Christmas period these numbers were ramped up as described in Section 6.2 above.

A summary of how UKPN and other DNOs were resourced during the event can be found at Appendix 9.

6.7 CTI platform effectiveness

The review has shown that UKPN's CTI systems and communication networks provide a secure and flexible platform for supporting its main contact centre and its overflow facilities. The call handling and messaging systems have the capacity to handle large volumes of telephone traffic. It appears that no issues affecting the operation of internal or service providers' CTI systems and communications networks were experienced during the Christmas period.

Call handling and messaging

Call advisor staffing effectiveness

To assess of the adequacy of the call advisor staffing levels the following measures were considered:

- The abandonment rate;
- Wait-time; the mean time taken for response by an advisor; and
- The number of advisors answering calls.

Answering customer calls

Answering all customers' calls by a call advisor, with a reasonable answer time, depends upon matching the number of advisors to the call volume, which is highly volatile, with significant and sudden peaks in the event of a system incident. In the situation of the volume of incoming calls exceeding the number of free advisors, calls will be queued and there will be a wait-time before the call is answered. The availability of an advisor becoming free is dependent on the duration of the call and any associated process work, such as updating the company's incident database.

The customer has the option to abandon the call at any time while waiting; the longer the wait the more likely the call will be abandoned. Based on an acceptable wait-time[30] the abandonment rate (AR) is often used as a service measure, the

[29] Eastern (EPN), London (LPN) and Southern (SPN)
[30] Variable under the control of the Contact Centre

target being appropriate to the service offered. In the case of emergency lines a very low abandonment rate must be targeted.

The abandonment rate is the ratio of the number of abandoned calls to the total number of queued calls. The abandonment rate is not just dependent upon answer time; type of call, time of day, caller tolerance and the availability of alternative sources of information may all be factors.

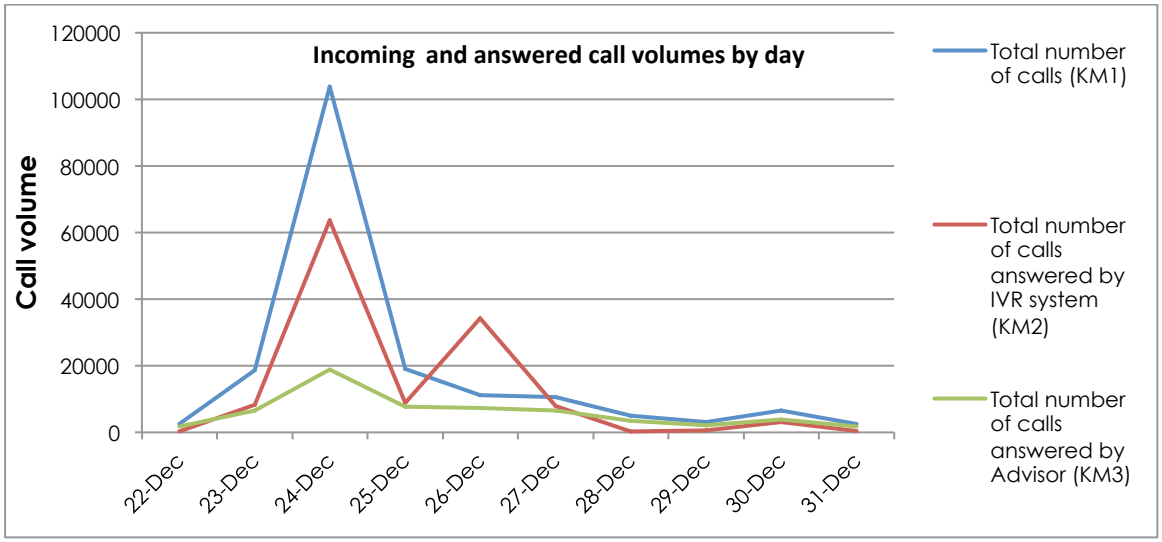


Chart 1 – Association between incoming and answered calls – UKPN

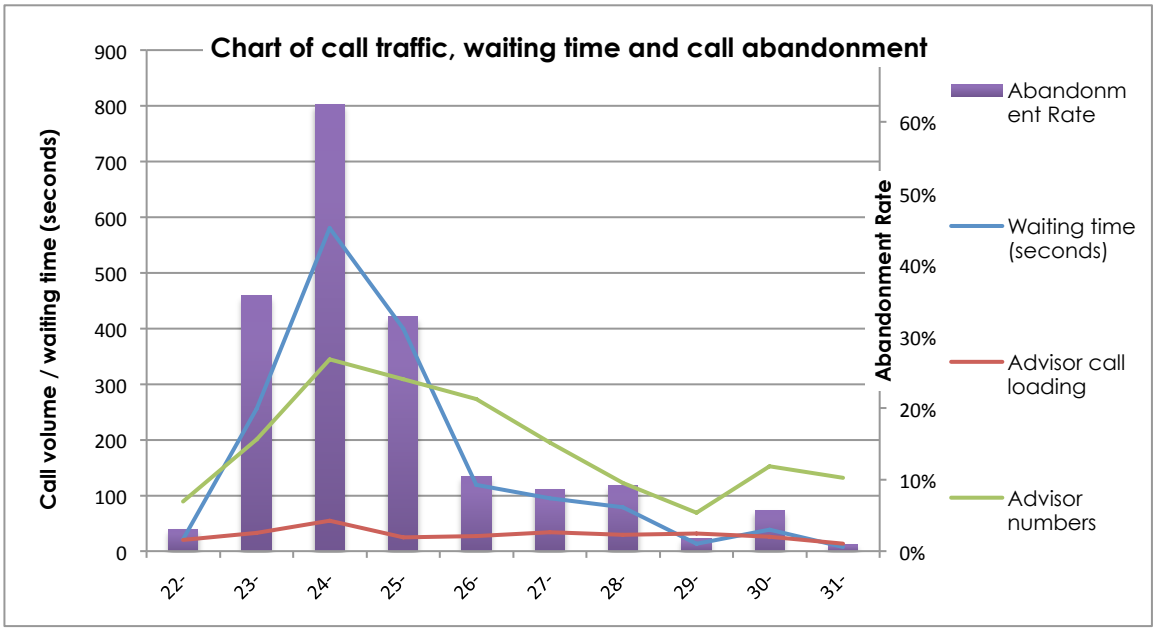


Chart 2 – Association of factors to abandoned calls

KM1	103,916		KM2/KM1	61%
KM2	63,600		KM3/KM1	18%
KM3	18,832		KM5/KM1	30%
KM5	31,268		Total	109%

Table 1 – Peak total call volumes - 24 December 2013

Observations

Table 1 shows the ratio of IVR-answered calls to advisor-answered calls as 3:1 and this can be implied from chart 1, with 30% unsuccessful calls.

Chart 1 reflects the data received from the company but shows that, on 26 December, the number of IVR-answered calls exceeds the total number of calls. This apparent anomaly remains unexplained at the time of submitting this report.

Chart 2 illustrates the association between the abandonment rates (which peak at 31%) and average waiting time (which peak over 9 minutes) from 23 to 25; December the observations associated with the two extracts in table 2 below may be valid in this case. From the chart, the long waiting times seem disproportionate to the number of call advisors; the impact of the numbers only showing after the peak. It should be noted however, that the use of daily figures mask the hour by hour volatility of the various associated factors.

Table 2 below shows extracts from the explanation of abandoned calls given by UKPN[31] alongside some observations:

Extract from UKPN	Review Observation
Volatility in call volumes and abandoned calls is related to restoration due to network switching, but defining how much this is specifically is complicated.	It may be possible to relate restorations times with abandonment numbers but may not be that straightforward.
Over 60% of incoming calls were from mobile phones which did not present a CLI[32] which could be associated with the customer database, so details relating to the location of the supply interruption would have been requested through the IVR.	It is a reasonable assumption that mobile users may be less tolerant to wait in the queue due to the call costs.

7 Internal review, evaluation and follow up

7.1 In-house reviews

UKPN always carries out a post-event review of system emergencies.

Once the wind strength had been accurately forecast, UKPN's post-evaluation of the storm of 23 to 29 December 2013 also shows that its model would have

[31] UKPN response to OFGEM's Stage 2 Storm Enquiry Questions - reply to additional questions.
[32] Calling line Identification.

accurately predicted the effects on its distribution networks and customer interruptions to a reasonable degree of accuracy.

In addition, acting on the initiatives arising from the DECC review, UKPN has identified the need to differentiate between two distinct types of scout: those authorised to isolate supplies and make incidents safe and those not so authorised. UKPN has also identified the need to identify people who will act as Customer Information Officers whose role will be to liaise directly with UKPN's customers during widespread system emergencies.

UKPN's post-storm reviews have also included considerations of network design, particularly the constructional features of its overhead line systems as discussed below.

7.2 Network condition and resilience

UKPN's overhead line standards are based upon those published by the ENA for the UK electricity supply industry. The company regularly reviews its design standards such that they are always evolving and being adapted to changes in the environment and to new techniques.

Thus UKPN's overhead line design standards are built from a requirement set down in the ENA's Technical specifications. UKPN also reports that, depending on the final outcomes and lessons learnt from the recent storms, its design standards and policy will be updated accordingly. Its key policy on vegetation management, which was issued in October 2013, is in accordance with the current ENA publications; which themselves are designed to comply with the requirements of the Electricity Safety Quality and Continuity of Supply Regulations (ESQCR). That one licensed area was behind with its programme has been documented[33].

UKPN had already started updating its overhead line construction and craft manuals as it identified there could be benefits from improving the main documents its delivery teams use to construct and maintain its overhead line networks. At low-voltage, UKPN is considering the wider use of 'weak-links' in its feeders equipped with Aerial Bundled Conductor (ABC) as several of its LV overhead line poles were snapped due to the pressure of falling trees impacting the ABC; the conductors themselves remained intact. At high-voltage, UKPN is reviewing the wider use of steel bracing in its 'H' Poles to provide increased mechanical strength for these structures.

It is important to note that, for the vast majority of overhead lines supported on single wood poles, their ability to withstand strong winds is largely dependent upon the footing resistance provided by the ground in which the poles are erected. Where, as is the case under review within UKPN, the ground is sodden, it offers a much reduced footing resistance and the severe gales are therefore likely to have a greater effect on the overhead line. In the most severe cases this can result in the line being blown over. A photograph of a typical example of this situation appears in the post-storm DECC report[34]. UKPN is reviewing the design of its most exposed overhead lines with a view to increasing the footing resistance of its single wood poles through the installation of 'kicking blocks' below the ground.

UKPN's audited returns to Ofgem show that the SPN licensed area networks have shown an improvement in performance in terms of customer interruptions (CI) by 31% and customer minutes lost (CML) by 48% since July 2008. The equivalent improvements in its EPN licensed area are 36% in CI and 46% in CML.

[33] See page 32 of 'Severe weather – Christmas 2013' – DECC. See page 13 of the Ofgem Report.
[34] See photograph on page 11 of the DECC review.

7.3 Learning from others

UKPN has produced its own in-house document detailing its learning from the recent bouts of severe weather.

UKPN has taken the lead in the review of the NEWSAC agreement linking-in with an industry-wide sharing of information concerning forecasts of severe weather. UKPN has been in contact with GTC (a large IDNO), with a view to providing additional resource in future events.

8 Review of performance against success factors

Ref	Activity	Review of UKPN's performance
SF1	Emergency plans and advance preparation	❑ UKPN has defined plans and procedures that are invoked whenever it receives a warning of severe weather likely to affect its geographical area. ❑ UKPN carries out an annual system emergency exercise to fully test its plans and procedures. UKPN has also carried-out 10 separate exercises and training sessions between February 2012 and September 2013. These sessions ensure it has adequate trained staff, such as call-advisors, it can deploy from its back office when needed as part of its ramp-up process. ❑ The company's plans and procedures include all aspects of a system emergency, from early warnings via weather forecasts; to ensuring all staff are aware of the possibility of a system emergency; to invoking its emergency response organisation ahead of the arrival of the impending severe weather. ❑ UKPN ramps-up its resources in accordance with its prediction of the impact of the severe weather upon its networks. All activities are covered in its preparations, including trained calladvisors, control centre staff, linesmen, scouting teams, stores staff, etc. ❑ UKPN has a dedicated telephone number for use by its PSR customers. This is manned by a specialist team within its main call centre. ❑ The company has its own fleet of mobile generators which it supplements when necessary from two external providers. ❑ Arising from its review of this event UKPN has identified 21 recommendations, which will be implemented during 2014.
SF2	Weather forecasts, prediction of impact and resource requirements	❑ UKPN relies upon the Met Office for regular weather forecasts, including updates when the situation changes. UKPN receives a rolling 5 day forecast provided twice daily which includes a UKPN specific risk assessment. The company also monitors the various alerts issued by the Environment Agency. ❑ When a forecast of severe weather is received UKPN uses its predictive modelling tool to determine the likely impact on its distribution systems. As noted above, where a system emergency is predicted, UKPN alerts its relevant staff, both front line and back office. The alert extends to external providers, such as contract linesmen, mobile generator suppliers and the Red Cross.

Ref	Activity	Review of UKPN's performance
		❑ UKPN uses the outputs from its predictive modelling to determine the likely resource requirements it will need to tackle the damage resulting from the impact of the severe weather. ❑ There was a significant issue over forecasting which delayed mobilisation.
SF3	Early reaction and mobilisation	❑ UKPN's emergency plans and procedures encompass the whole of its organisation, from its CEO to its field teams. ❑ Steered by its incident management team, the company's procedures clearly provide clarity on mobilising staff, including: transferring them between licensed areas as necessary, increasing the number of call advisors, cancelling pre-arranged work and contacting customers to agree alternative dates for customer-agreed work. ❑ UKPN's predictive modelling includes the identification of locations where the most damage may occur and co-ordinates the disposition of linesmen, scouts and senior-authorised people accordingly. ❑ The severe storm of Christmas 2013 had a 36-hour duration over UKPN's geographical area, delaying climbing activities until the wind subsided. Also, a warning of lightning activity on the morning of 25 December 2013, meant that linesmen could not climb until the danger had passed.
SF4	System automation to restore bulk customer numbers	❑ Over a number of years, UKPN has invested in network automation and tele-control on its high-voltage networks, and reports the consequential reductions since July 2008 in CI and CML for its EPN licensed area to be 36% and 46% respectively. For SPN the figures are 31% and 48% respectively. ❑ In the early throes of restoration work, having let the system automation restore as many customers as possible, UKPN's control engineers were busy using tele-controlled switching to restore as many non-damaged sections of feeders as possible, ahead of manual field operations further sectionalising feeders to identify faulty sections.
SF5	Telephone response & answering service	❑ In association with two other DNOs and their supplier UKPN has been developing an enhanced telephone platform known as 'STORM'®. This greatly increases the number of simultaneous incoming telephone calls that the company can handle. ❑ All people who handle calls from UKPN's customers are trained to use the company's incident database, including those staff who take overflow

Ref	Activity	Review of UKPN's performance
		callas and those from its service provider. ❑ UKPN had 345 call-advisers at work on 24 December 2013. ❑ UKPN is trialling call taking from home to help with its ramp-up and also to provide for situations when travelling is difficult due to such things as fallen trees or flooding. ❑ Rigorous stress testing regime and contingency plans for under-performance / failure. Implementing the new system over the winter months may have exposed the company to risk.
SF6	Gathering field information	❑ To supplement the information it receives from its field staff, UKPN deploys scouts to seek locations where damage may have occurred. The information relayed back includes a description of the incident, what supplies are affected, what materials are needed and any access restrictions. ❑ In addition to the above, UKPN has identified the need to train scouts in isolating supplies to make safe and / or to stand-by where a potential danger to the public exists. ❑ To augment its line patrolling activity, UKPN called upon its helicopter provider and upon WPD's helicopter consortium to fly its EHV and HV overhead lines.
SF7	Processing Information	❑ UKPN uses the 'ENMAC' / 'Power on Fusion' SCADA system to hold its incident records and UKPN trains all people it calls upon to act as call advisors to use the associated incident reporting and recording system so that, when dealing with a customer call, these people are able to rely the most up-to-date-information to the customer as well as enter any new information that the customer relates. ❑ UKPN's approach includes making this information available throughout its emergency organisation and response activities.
SF8	Rapid dispatch of switching resource to site	❑ UKPN's restoration strategy is initially based on getting as many customers' supplies restored as soon as possible. ❑ Thus, once automation and tele-controlled switching have completed as much restoration as possible, UKPN deploys field operatives to continue sectionalising feeders so as to continue to restore as many customers' supplies as possible in the shortest time. ❑ All UKPN operational staff use electronic navigation aids which include the locations of switching points. ❑ On 24 December UKPN had 52 rapid response staff working in EPN and 56 in SPN.

Ref	Activity	Review of UKPN's performance
SF9	Ensure adequate resources in terms of people, transport materials	❑ UKPN's emergency plan and procedures include designating people and deputies to undertake the key roles within its emergency response structure, from its incident management team through all 'levels' of its organisation. ❑ UKPN has strategically placed additional storm stores. ❑ UKPN had no issues with either materials or transport.
SF10	Adequate overhead line staff	❑ UKPN has its own skilled linesmen and also calls upon contractors as necessary to supplement its own staff. As can be seen from the resourcing analysis in the main report, UKPN owns about 17% of the overhead line and controls about 10.5% of the overhead staff and contractors. In relative terms, it is therefore lightly resourced. It makes significant use of contractors which in terms of availability, increases its risk profile in managing events of this scale. ❑ Once the Met Office forecast worsened on Sunday 22 December 2013 and UKPN realised it could not rely upon transferring its EPN staff to SPN, it invoked the NEWSAC agreement on Sunday 22 December 2013. Resources were not available until 28 December. ❑ Escalation after the weekend of the festive holiday was likely to have been a factor in UKPN's relatively low success rate in mobilising field staff. ❑ UKPN is taking the lead in the national review of the NEWSAC agreement.
SF11	Management of repairs	❑ Through interrogation of its incident database, UKPN is readily able to identify the number and location of its known incidents. Where, in response to customer calls, scouting has located downstream incidents that would otherwise be hidden until the upstream supply is re-energised, these too are entered into UKPN's database. ❑ UKPN has an established prioritisation for restoring supplies based on higher voltages first and use of automation and remote control, taking account of safety, customer numbers and PSR customers. ❑ As stated above, UKPN has a team dedicated to handing its telephone calls from, and to, its PSR customers and is pro-active in providing them with up-to-date information on supply restoration. ❑ Where difficulties exist, UKPN provides its PSR customers with a support pack, which includes a torch and mobile telephone. ❑ UKPN is also pro-active in providing hot meals and alternative accommodation where customers'

Ref	Activity	Review of UKPN's performance
		supplies cannot be restored for some time. UKPN is also active in invoking arrangements with the Red Cross in supporting its PSR customers.
SF12	Manage the event tail	❑ UKPN's restoration strategy provides for the restoration of as many customers' supplies as possible during the early stages of its response to the severe weather via its network automation and tele-controlled switching, followed by manual switching in the field. ❑ Given that UKPN reports that the Christmas storms lasted for about 36 hours, priorities were inevitably changing as the impact of the storm moved across its area. Consequently, UKPN had to consider its customers still off supply from the early time of the storm alongside those who more recently lost their supplies.
SF13	Use of mobile Generation	❑ To help restore supplies, UKPN used its own mobile generators, supplemented by contracted-in units to re-energise low voltage feeders where it was safe to do so. By this means, UKPN deployed a total of 108 mobile generators in its EPN licensed area and 94 within its SPN area. It also deployed 46 mobile generators within its LPN licensed area. ❑ The provision of mobile generation is under review.
SF14	Use of all media channels to communicate with customers	❑ UKPN has a dedicated team in its main contact centre whose role is to operate the company's social media activity. UPKN is the first DNO to operate a social media facility 24/7. It also has an interactive web-based map which allows its customers to identify localities where incidents exist. ❑ UKPN's social media team, its messaging system and the web-based map all provide the same information as is stored on the company's incident database. ❑ There were 165,268 hits on the UKPN website and its live power cut map was viewed 62877 times. UKPN posted 7091 Twitter messages and made 920 Facebook updates. Almost 1000 customers used the online power cut reporting facility. ❑ UKPN also provides a facility for SMS messaging for its customers.
SF15	Provide realistic estimates of repair duration and informing customers	❑ At the beginning of any incident, information on likely restoration time is not usually accurate as the precise nature of the problem is at that time unknown. ❑ As restoration work progresses, it is usually possible to gain a better appreciation of the time needed to restore all supplies. ❑ To cater for the unfolding situation, UKPN places a 'general' message listing the post codes affected

Ref	Activity	Review of UKPN's performance
		by a known incident.
SF16	Provide feedback to customers with regular updates	❑ As more information becomes available, UKPN updates its message accordingly and normally not less frequently than every two hours. ❑ UKPN has a corporate communications team whose role includes providing information to the media, including newspapers and television. ❑ UKPN's Director of Customer Services appeared on national television to answer questions on the company's progress towards restoring its customers' supplies.
SF17	Local presence and community contacts	❑ An outcome of UKPN's review of the system emergencies of December 2013 is to identify that it needs to do more in customer liaison at the 'sharp-end' It is therefore actively identifying people to act as Customer Information Officers, whose face-to-face role will be separate from scouting activities in providing information to UKPN's customers in their localities.
S18	Provide adequate welfare facilities to PSR customers from start of event and to all customers who are without supply for more than 48 hours	❑ As noted above, UKPN is pro-active in contacting its PSR customers, making 892 outgoing calls during the December storms. It provided support packs to help them during power failures. The Red Cross, who attended 37 sites during the December storms. ❑ During the December storms, UKPN reserved 700 hotel rooms, of which 178 were used, and provided 2,393 hot meals across 50 locations. ❑ Where a medical need exists, UKPN provided a mobile generator where it was safe to restore supply. Its policy towards mobile generation is under review. ❑ On 24 December UKPN committed to double EGS payments and to pay £75 to each customer off supply on Christmas Day. ❑ UKPN has over 380,000 registered PSR customers.

Appendix 6 Western Power Distribution (WPD)

1 Summary

WPD suffered one of the most severe weather events in recent years, resulting in 756 network incidents, interrupting supplies to 57,695 customers on its south western network. No customers were without electricity for more than 48 hours, the worst case being 24 hours, 19 minutes.

WPD's telephony system is focused on two call centres and is available to staff across the company. It was able to cope with demand during the Christmas event. The automatic messaging system appears to have satisfied customers, contributing to reducing the demand on call advisors.

WPD's practice of making trained staff available from all parts of the business to take customer calls in an emergency event, including those logging in from their homes, supported by the messaging systems meant that WPD was resourced to cope.

WPD operates 33% of the country's overhead line networks and in total employs 44% of the skilled overhead line strength, with little dependence on contractors. It has sufficient overhead line staff to cope with a more severe event than it suffered in December 2013.

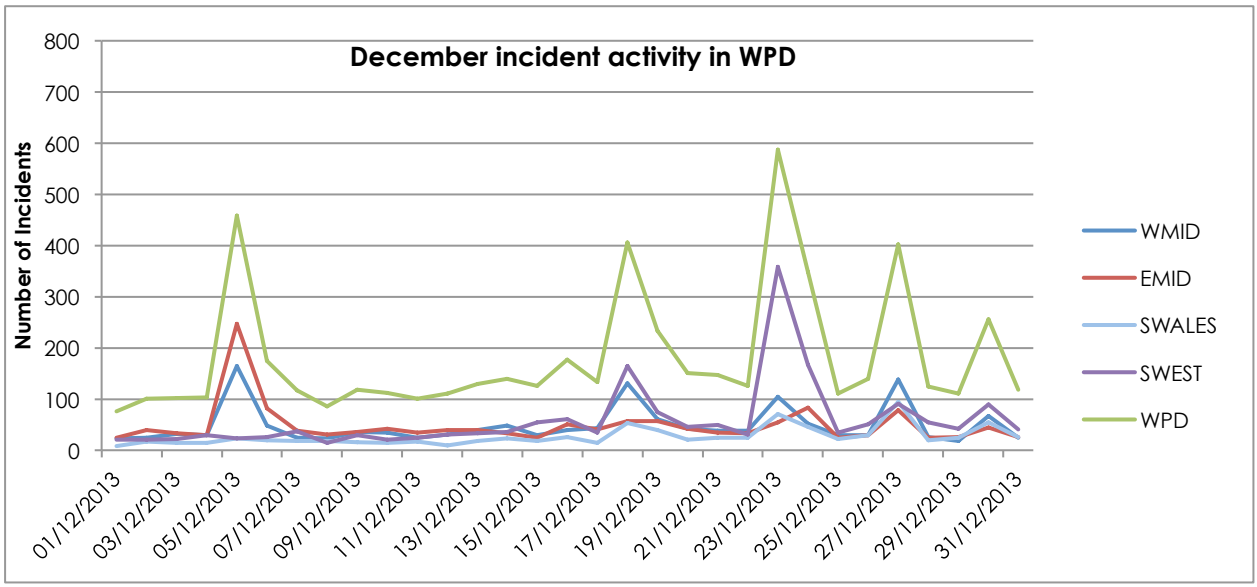
2 The company

Western Power Distribution (WPD) is the electricity DNO for the Midlands, South West and South Wales, delivering electricity to over 7.8 million customers over a 55,500 square kilometres service area.

WPD owns four distribution licensed areas: East Midlands, West Midlands, South Wales and South West. The aggregate network consists of about 220,000 km of overhead lines and underground cables, and 185,000 substations. The DNO employs over 6,000 staff.

3 The event

3.1 December incident activity in WPD



3.2 Scale of the Christmas event in WPD

WPD (EMID) was first impacted on 27 December with the event profile below:

Number of short Interruptions (< 3mins)	24,719
Number of incidents	296
Number of Customers losing supply (3 mins and over)	18,248
Number restored within 1 hour	14,852 (81%)
Number restored within 24 hours	18,248 (100%)
Number restored within 48 hours	18,248 (100%)
Number without supply > 48 hours	0
Customer longest without supply	11.8 hours

WPD (WMID) was first impacted on 27 December with the event profile below:

Number of short Interruptions (< 3mins)	40,772
Number of incidents	379
Number of Customers losing supply (3 mins and over)	34,962
Number restored within 1 hour	23,315 (67%)
Number restored within 24 hours	34,962 (100%)
Number restored within 48 hours	34,962 (100%)
Number without supply > 48 hours	0
Customer longest without supply	14.6 hours

WPD (SWales) was first impacted on 23 December with the event profile below:

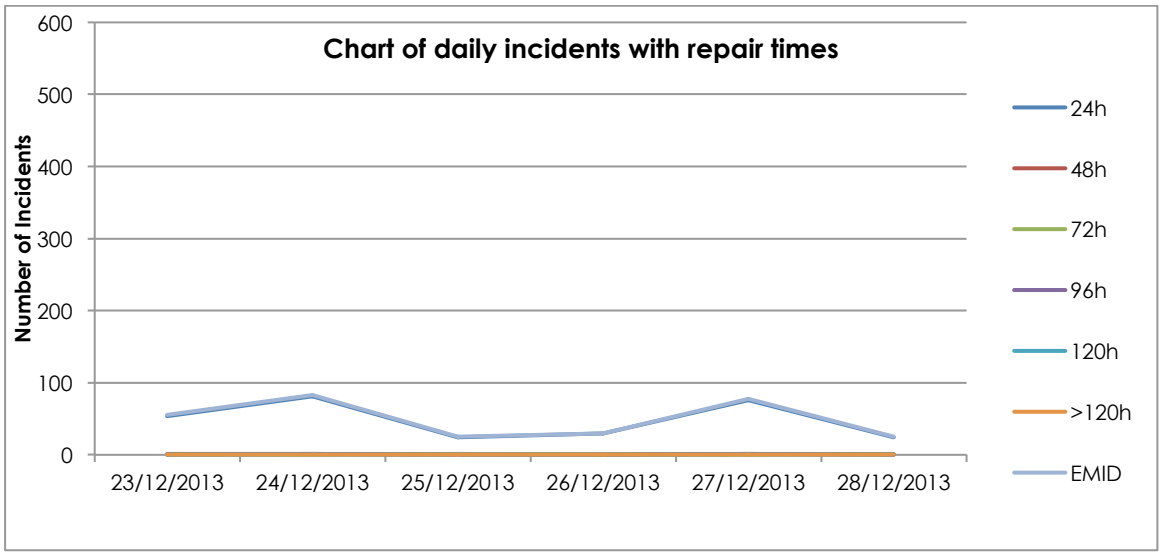
Number of short Interruptions (< 3mins)	111,106
Number of incidents	284
Number of Customers losing supply (3 mins and over)	23,207
Number restored within 1 hour	16,873 (73%)
Number restored within 24 hours	23,207 (100%)
Number restored within 48 hours	23,207 (100%)
Number without supply > 48 hours	0
Customer longest without supply	16.5 hours

WPD (SWest) was first impacted on 23 December with the event profile below:

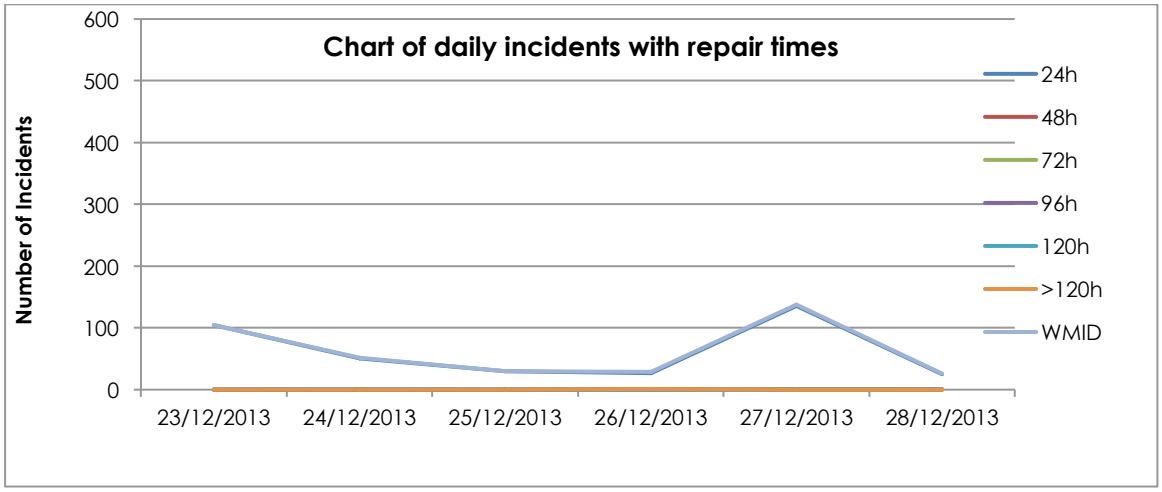
Number of short Interruptions (< 3mins)	140,536
Number of incidents	755
Number of Customers losing supply (3 mins and over)	57,695
Number restored within 1 hour	27,135 (47%)
Number restored within 24 hours	57,682 (99.9%+)
Number restored within 48 hours	57,695 (100%)
Number without supply > 48 hours	0
Customer longest without supply	24.3 hours

3.3 Incidents per day with repair periods by licensed area

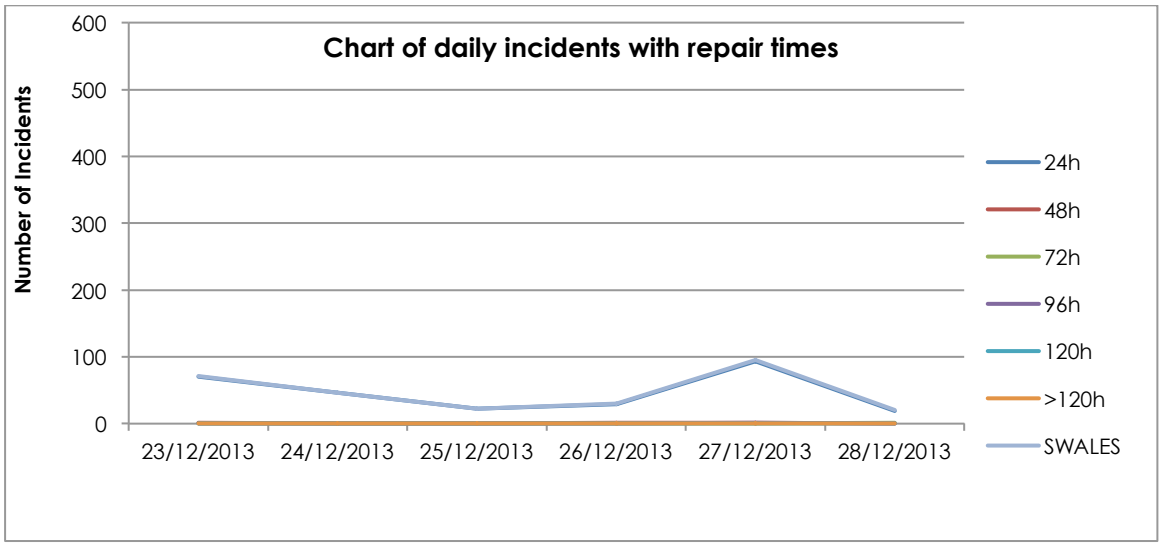
WPD (EMID)



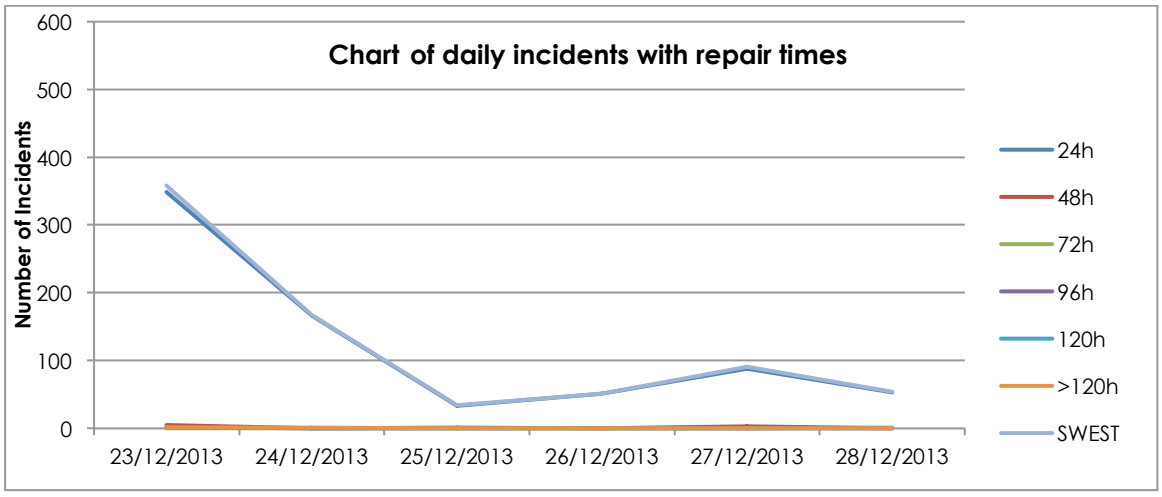
WPD (WMID)



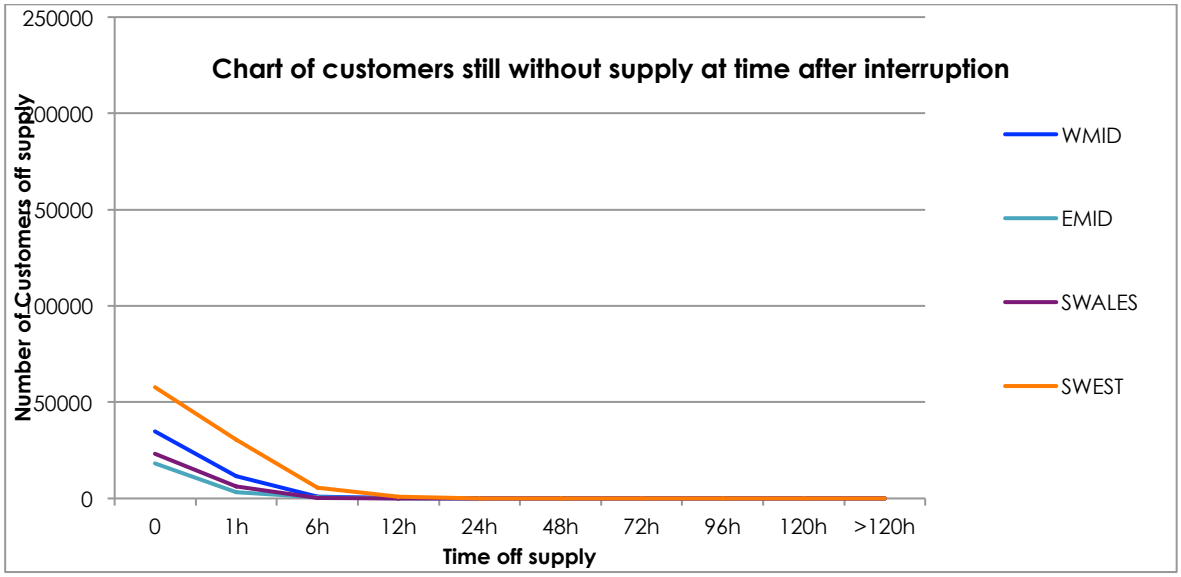
WPD (SWales)



WPD (SWest)



3.4 Customers interrupted (3mins and over) and restoration times



4 Planning and preparedness

4.1 In house plans and procedures

WPD has a suite of plans and procedures covering the preparation for, and response to, a weather-related system emergency. These are reviewed at three yearly intervals, the most recent updates to the core policies being between October 2012 and December 2014. The two control centres at Cardiff and Castle Donington are routinely checked (three monthly) and the contingency control and dispatch centres at Alfreton, Bristol, Church Village and Swansea were last subject to a full rehearsal on 20 September 2013. To add resilience, the control room at Cardiff is being expanded and redeveloped to provide an additional 10 operational desks for use during 'ramp up'.

The emphasis in emergency planning and preparation is to engage the whole organisation. Escalation is characterised as 'business as usual only more', with the emphasis being on people doing what they do as a matter of routine, meaning that during severe weather events staff are already familiar with the duties associated with their roles during an emergency.

Plans may be described as simple but they are implemented as part of a management philosophy which involves the clear and devolved responsibility for escalation; wide access to decision-critical information (weather forecasts, a real time screen allowing access to the incident management and control system on each manager's desk); and what some might describe as over-reacting to severe weather forecasts. Quick and flexible reaction is required since events will always be, to varying degrees, different from that predicted. Such responsiveness can only

come, it is argued, by devolving decision making to those close to the events as they unfold[35].

WPD's philosophy is that 'There is no such thing as over-reaction', preferring this philosophy to a reliance on predictive models which attempt to relate weather factors – principally wind speed and gusts - to faults and network damage.

Over-reaction when events do not turn out to be as severe / prolonged or have different network impact to that which might have been anticipated will incur costs which might otherwise have been avoided. However, WPD argues that these are more than offset by the benefits – not simply in terms of meeting restoration targets and fewer payments to customers but also, over time, in improving broader stakeholder perceptions, such as the Ofgem broad measure of customer satisfaction[36].

In addition to the systems and processes described below, there are organisational aspects of WPD's strategy which facilitate resilience and responsiveness in emergency conditions. Important among these are:

- The four licensed areas cover an area east to west of the UK mainland. Consequently, the company can facilitate the movement and optimisation of resources internally, without reference to NEWSAC, so that it is better able to cope with severe weather in all but a national weather event (i.e. one which affects both east and west at the same time; is of equal severity; and for the same or similar duration);
- There are scale advantages in that WPD can command significant overhead line staff, some 44% of the available resource on the UK mainland;
- WPD has in-sourced certain craft functions[37], which means that, as a general rule, only overhead line staff on major projects are contractors. The ratio of direct to contractor overhead line staff is low (1943 direct; 88 contract). This study does not attempt an analysis of the costs and benefits of this approach but at times of stress, with directly employed staff there are no questions of access to, or competition between DNOs for these people as they are under the direct and immediate control of WPD. As the DECC review summarised the situation;

  '*Western Power Distribution has a large number of direct labour linesmen and also covers four contiguous licence areas with the result that it has a higher capacity than other operators to flex its resources and thus enable their rapid redeployment*'[38].

  This resilience is based on a commitment to recruit and train young people and offer routes through for existing staff – a commitment which predates the workforce renewal incentive under DPCR5. This has led to continuity in building a well trained and equipped workforce, deployed appropriately across WPD's four licensed areas; and

[35] During the visit, comparisons were drawn between the WPD approach and that which pertained pre-acquisition in the EME and ME licensed areas, where decisions on escalation were typically deferred, often by hours, for consideration at formally convened 'escalation' executive committee meetings.

[36] See 'Electricity Distribution Broad Measure of Customer Service - Customer Satisfaction Survey Results 2012 -13' in which the four WPD licensed areas perform consistently well compared to the other DNOs on each of the relevant measures.
Detail available at www.ofgem.gov.uk/ofgem-publications/84659/cssoverview1213.pdf

[37] About 200 people have been transferred from contactors under TUPE - the Transfer of Undertakings (Protection of Employment) Regulations – to become employees of WPD.

[38] DECC review, section 2.5

- Certain additional depots / work reporting centres are being acquired and existing sites refurbished to ensure geographic resilience in the event of weather preventing or disrupting the movement of resources. Keeping resources near to the work is a feature of WPD's operating philosophy. The company also manages geographically. This, it is argued, minimises any tension there might be between the resourcing needs of what in some companies are separate business streams (e.g. new connections is a separately managed function in some companies).

Whilst it might not be possible to quantify the direct impact of this strategic direction on restoration times, the organisation and access to resources, together with the ability to flex this across the territory, appears to provide a solid foundation on which to base the management of severe weather events.

In terms of event preparation, WPD has in place what have tended to become standardised approaches and practices throughout the industry in terms of strengthening the staffing of control rooms; placing on standby 'ramp up' customer contact centres (in WPD's case: Bodmin, Bristol, Cardiff, Castle Donington, Huthwaite, Plymouth, Swansea and Tipton) and home workers ready to take calls out of hours; helicopters on standby (WPD has its own fleet of helicopters that, via the industry's consortium arrangements, are available to other DNOs); contractors and tree cutters on standby; depots and stores open early[39]; flood response and specialist equipment on standby; the Red Cross placed on standby.

For the event between 23 to 28 December this meant that all affected WPD offices remained open and staffed overnight on 23 December, remaining so until late on Christmas Eve. WPD moved an additional 70 teams (126 people) into the south west to support the restoration effort.

4.2 Weather forecasting

WPD uses the services of the MeteoGroup and is satisfied with the service provided, which is, in any event, always under review. Arising from the sharing of good practice from the DECC review, the company will now be taking a 10-day forecast in addition to its current system of forecasts and warnings[40].

WPD's territory was exposed to the full range of severe weather discussed in the main report, namely the St Jude storm of 27/28 October 2013; the east coast tidal surge of 5/6 December; the Christmas storms which hit on 23 December (and the focus of this review); the coastal flooding, high winds and lightning on 3/4 January and the multiple events throughout February 2014. The company reports that, in some respects, the February events were the toughest to manage because of the series of storms which hit its South Wales and South West licensed areas in succession.

The evidence confirms that, in response to forecasts of the 23/24 December event, WPD began preparations on 18 December; staff were mobilised and held ready from 20 December - earlier than certain other companies - which gave WPD a decisive advantage when the severe weather struck.

Early escalation was critical in this event, since it enabled standby rotas to be augmented beyond the already increased levels (WPD always enhances its standby rotas for periods such as Christmas and New Year), key staff mobilised and general availability managed in advance of staff leaving work for the Christmas

[39] Stock availability is visible at all times via the Warehouse Management Control System.
[40] DECC review, recommendation F1 – Weather forecasting and escalation triggers.

week (Friday 20 December being the last working day for most staff before Christmas week).

5 Response and restoration

5.1 Restoration strategy

Christmas is recognised as a time when work programmes are shaped to minimise planned works and, for WPD, holidays were managed so as to ensure a minimum cover of 50%, by discipline during the Christmas week; up to 65% in most areas. Standby was doubled, meaning staff available out of normal hours increased from 11% to 22%. Any residual planned work was cancelled to maximise network resilience.

Few holidays were cancelled. However, during the event, some holidays for WPD's call-centre staff were cancelled and others postponed. Overall, some 70% of networks staff came into work; a demonstration of commitment. No additional payments or incentives, over and above those normally payable for standby and out of hours working, were offered[41].

By 'over-reacting' 126 field staff (and three contractors already familiar with the company's working practices.) were moved towards the south west to support the restoration effort. This reflects WPD's perspective that, for a given weather event, it is the mix of faults and resources deployed to repair these faults that are the key determinants of restoration times.

Clearing the faults and restoring customers within an acceptable timescale had benefits down the line in terms of lessening the levels of welfare and additional customer support required.

WPD has invested in mobile generation from 500kVA down. This mobile generation is used extensively as part of the company's restoration strategy. To ensure the plant is as close as practicable to place of need, WPD stations a mix of mobile generator sizes at all of its operational Depots. WPD also has a contract with a supplier for additional sets and for re-fuelling both WPD's and contacted-in generation sets[42].

The company owns and operates its own helicopter unit with a fleet of four EC135 machines. It owns and operates seven pumping tenders for use during flood management. Like most DNOs, WPD operates what might be termed as a winter fleet for use all year round, meaning that 4x4 vehicles and variants are used extensively. This is augmented over the winter months by hiring in, or having an immediate access to, an additional 42 four-wheel drive vehicles which can be used by those staff not regularly needing this type of vehicle (for example: scouting, bringing in control or call handling staff when travel conditions are difficult, attending PSR customers or customer welfare centres).

5.2 Effectiveness

In the south west the Christmas event was a category 2 severe weather event, within the Ofgem definitions[43].

[41] In response to the direct question included in the questionnaire, WPD report that only 63 staff on leave at Christmas declined to come in.

[42] Anecdotal only but WPD has abandoned the former practice of one of the companies it acquired of undertaking a cost benefit review of deploying a generator; now the direct deployment of generators is the norm.

[43] These and related definitions can be found in the 'Electricity Distribution Price Control Customer Service

WPD had no guaranteed standard failures.

The statistics on restoration performance are set out in detail in the WPD Severe Weather Performance Report – 1 December 2013 to 8 January 2014[44].

By most key indicators WPD's performance was impressive for the scale of the event. All customers were restored within 24 hours and 19 minutes.

In relative terms, WPD is well resourced as is clear from the analysis in the main body of the report. WPD participated in NEWSAC conference calls but did not request any assistance. WPD provided staff and resources to NPG on 5 December (12 staff); and on 28 December had arranged to export seven staff to ENWL but, in the event, they were stood down before being dispatched. WPD also sent one of its helicopters to assist UKPN in patrolling its higher-voltage networks.

Other DNOs have elements of WPD's preparedness in place and some are implementing new and innovative solutions. What comes through is the commitment of the whole organisation's resources to restoring supplies and keeping customers informed during and after a severe weather event. On the evidence we reviewed, almost everyone in WPD contributes and has a well understood storm role.

6 Keeping customers informed

6.1 Overview

Following a major power supply interruption all DNOs recognise the importance of keeping their customers informed on the progress of restoration. With large numbers affected this can only be achieved by the effective use of a telephony platform and associated computer-based systems combined with the skills and experience of staff to manage, operate and utilise the various available facilities.

All DNOs have implemented a telephony platform with call handling and messaging facilities; differing only in technical aspects and the level of unification between the various systems that deliver and present the required information. Applying computer telephony integration (CTI) technology, a total unification strategy would provide a complete network to desktop infrastructure, including comprehensive functionality at individual workstations.

In general, the technical aspects of each DNO's telephony platform is adequate and fit for purpose and, other than short-term technical faults, performance can be characterised by the quantity of calls answered within an acceptable time and the availability and quality of messages which satisfy customers' expectations.

The review visit enabled meetings with WPD's staff at all levels directly involved during the Christmas emergency including customer-facing call advisors. WPD operates a CTI[45] telephony system with robust call handling and messaging processes in place for keeping customers' informed.

Assessment process

The review of WPD's telephony platform, the associated computer-based systems and communications networks was only conducted at a high-level.

Reporting - Regulatory Instructions and Guidance' – see especially Severe Weather Category Boundaries.

[44] As submitted to Ofgem in response to an information request on 15 January 2014.

[45] Computer Telephony Integrated

The assessment focused upon WPD's effectiveness in keeping its customers informed with accurate and timely supply failure and restoration information during the Christmas emergency period. The main areas reviewed covered the acquisition, accessibility and delivery aspects of the information to WPD's customers through its telephony platform and other media.

6.2 Planning and preparedness

WPD routinely monitors and checks the performance of its telephony system during business as usual, supplemented by regular three-monthly functionality checks. The structure of the company, both in terms of staff and CTI systems, provides a quick and measured approach to dealing with an emergency event when it occurs. The pattern of extreme weather lasted from St. Jude's storm on 28 October 2013, through and beyond the Christmas period into February 2014.

The performance of the call handling, associated processes and systems over the period up to Christmas has not been reviewed, but WPD reports that all systems performed as expected.

6.3 Acquiring information

Early indications of the potential damage caused by the winds are alerts from the network control centre systems, which continuously monitor the higher-voltage power networks. Indications of loss of supplies are passed from the control centre systems[46] via the fault management system to the interactive voice response (IVR) facility. The IVR then makes available an incident-specific or geographically tailored message for incoming customer calls. At low voltage, customers' loss of supply calls are registered automatically by IVR or manually by a call advisor into the fault management system, providing additional information to dispatchers and control engineers who may not be aware of a particular incident. The same information is also available to the contact centre call advisors who can inform those affected customers who elect to speak to an advisor.

The facility for automatically linking customers' telephone numbers[47] with the fault management system is a very effective way of making fault information available and reducing the volume of queued calls waiting to be answered.

Key information comes from the field teams working on repairs using handheld devices to directly enter details into the fault management system; location, nature, impact on public safety and restoration progress updates. WPD's in-house messaging system is linked to its fault management system, ensuring that the messaging service gives customers the same level of detail as that given by call advisors.

WPD reported there were no issues with the communication systems between field staff and control centre or dispatch during the storm period. However, in the initial stages of a system emergency, the quantity of calls has the potential to become a bottleneck due to the disparity of staff numbers between field and control centre. It is recognised that in the first hour of an emergency, with the technology now available, a control engineer may be more effective in restoring customer supplies by using remote tele-controlled switching, than in dealing with more localised operations carried-out in the field.

[46] ENMAC™ / PowerOnFusion™
[47] If registered

6.4 Communicating the information

Incident information available to customers is taken direct from the fault management system ensuring that it is as consistent, accurate and as up-to-date as is achievable.

WPD communicates with customers through the customers' channel of choice; inbound telephony with options for speech contact; IVR speech; SMS messaging; proactive outbound calls; website and Twitter.

WPD's CTI platform automatically links customers' telephone numbers with incident information enabling the call advisors to view the information when the customer's call is answered. This is the only way to make information available to many customers effectively and to reduce the talk-time (duration) of the call.

6.5 Systems and their resilience

WPD's CTI platform[48] and communications networks enable company-wide access to authorised staff to process or view the fault information, including those working from home.

Local interconnectivity is provided by duplicated local area networks. Connections to remote key locations and offices are provided by a private wide area network, using secure connections within a high capacity, high-speed digital communications network.

The call handling and HVCT messaging systems have the capacity to handle large volumes of telephone traffic and to delivery messages via IVR or SMS very effectively.

Third party service providers were informed in advance of the pending event and all planned IT work was suspended. WPD reports that no issues affected its CTI systems and associated communications networks during the Christmas period.

6.6 Resourcing

WPD has two contact centres located at Cardiff and Castle Donington, each handling two of the four licensed areas. Staff trained to undertake both call advisor and dispatcher roles are located at each centre with other staff, trained as call advisors available at a further eight locations to support the call advisors at the main contact centres; the option for homeworking which the company has implemented also provides greater flexibility. With these arrangements, WPD was able to increase the numbers for call handling at very short notice, with plans in place by 18 December.

6.7 CTI platform effectiveness

The review has shown that WPD's CTI systems and communication networks provide a secure and flexible platform for supporting the contact centre and its overflow facilities. The call-handling and messaging systems have the capacity to handle large volumes of telephone traffic. No issues affecting the operation of internal or service providers' CTI systems and communications networks were experienced during the Christmas period.

Call advisor staffing effectiveness

[48] High Volume Call Taker (HVCT), ENMAC™ / PowerOnFusion™, Siemens Contact Centre Openscape

To assess of the adequacy of the advisor staffing the following measures were considered:

- The abandonment rate;
- Wait-time; the mean time taken for response by an advisor; and
- The number of advisors answering calls.

Answering customer calls

Answering all customers' calls by call advisors, with a reasonable answer time, depends upon matching the number of advisors to the call volume, which is highly volatile, with significant and sudden peaks in the event of a system incident. When the volume of incoming calls exceeds the number of free advisors, calls will be queued and there will be a waiting time before the call is answered. The availability of an advisor becoming free is dependent on the duration of the call and any associated process work, such as updating the company's incident database.

The customer has the option to abandon the call at any time while waiting; the longer the wait the more likely the call will be abandoned. Based on an acceptable wait-time[49] the abandonment rate (AR) is often used as a service measure, the target being appropriate to the service offered. In the case of emergency lines a very low abandonment rate must be targeted.

The abandonment rate is ratio of the number of abandoned calls to the total number of queued calls. The abandonment rate is not just dependent upon answer time; type of call, time of day, caller tolerance, and availability of alternatives may all be factors.

WPD's call advisors are located at its two contact centres; normally one serving the East and West Midlands licensed areas and the other serving the South Wales and South West licensed areas. With the flexibility of the CIT and communications they become a single virtual contact centre. Two sets of charts of KM data have been produced but the observations and comments cover both.

The association between the total number of calls offered to the call handling system and those calls answered by advisors or the IVR is illustrated in the charts below.

[49] Variable under the control of the Contact Centre

WPD East and West Midlands

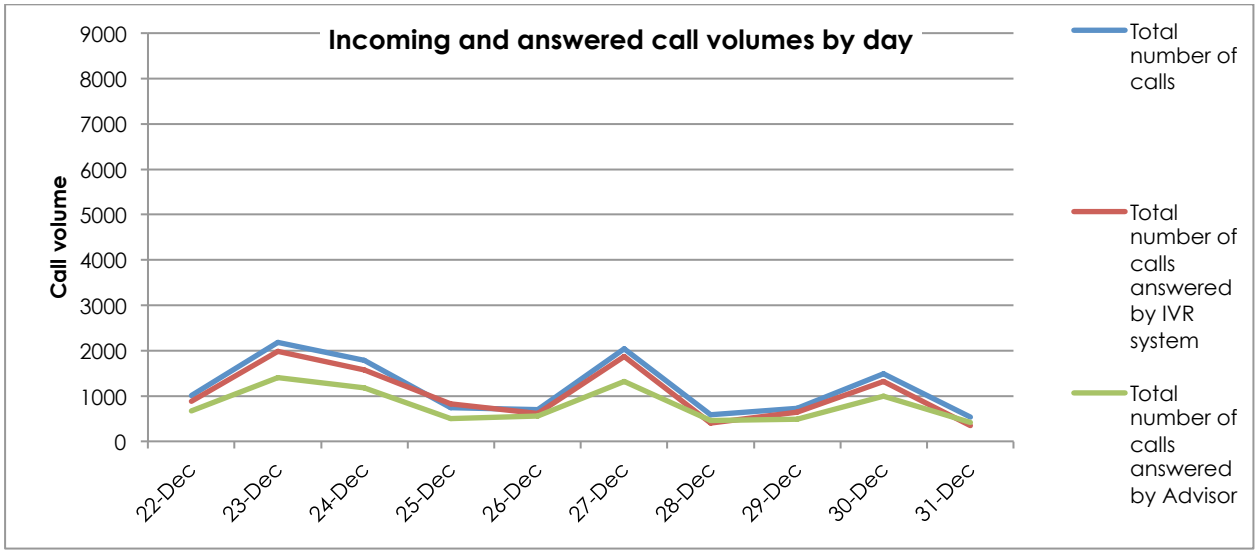


Chart 1 – Association between incoming and answered calls - East and West Midlands

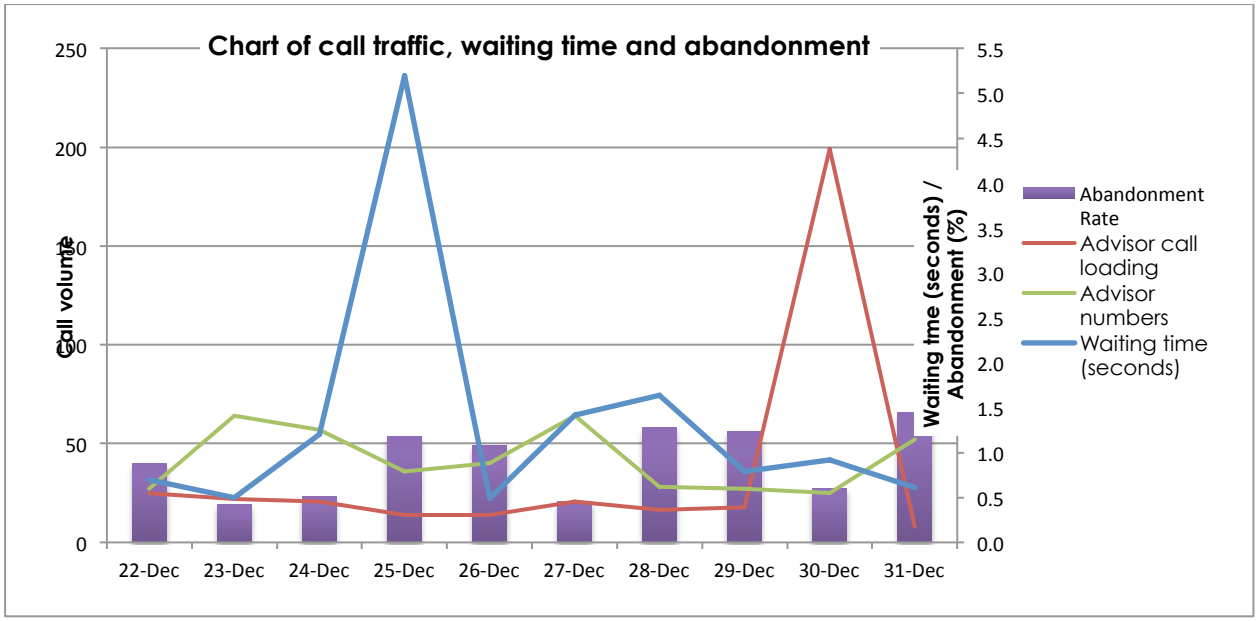


Chart 2 – Association of factors to abandoned calls - East and West Midlands

KM1	2185		KM2/KM1	91%
KM2	1987		KM3/KM1	64%
KM3	1405		KM5/KM1	<1%
KM5	6		Total	N/A

Table 1 – peak total call volume – East and West Midlands – 27 December 2013

Observations

Chart 1 and Table 1 show that 91% of all incoming calls were answered by the IVR and 64% answered directly or via the IVR.

Chart 2 shows average waiting time of below 2 seconds, peaking at 5.2 seconds on Christmas Day, with an abandonment rate of less than 1.5%. The chart shows a varied staffing level which follows the profile of the call volume.

WPD SWales and SWest

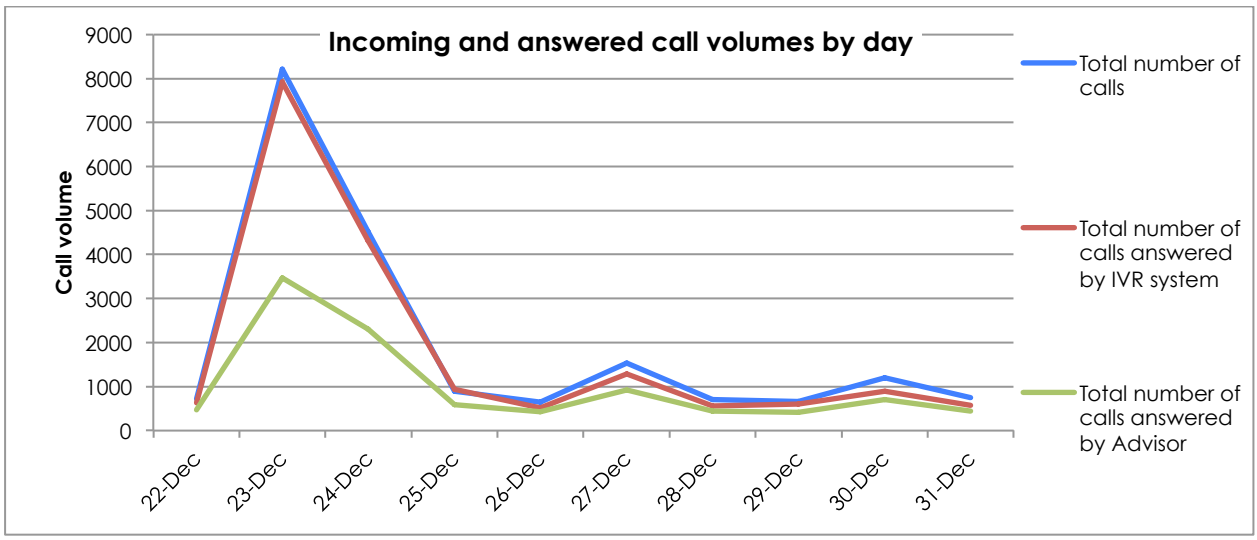


Chart 3 – Association between incoming and answered calls - South West and South Wales

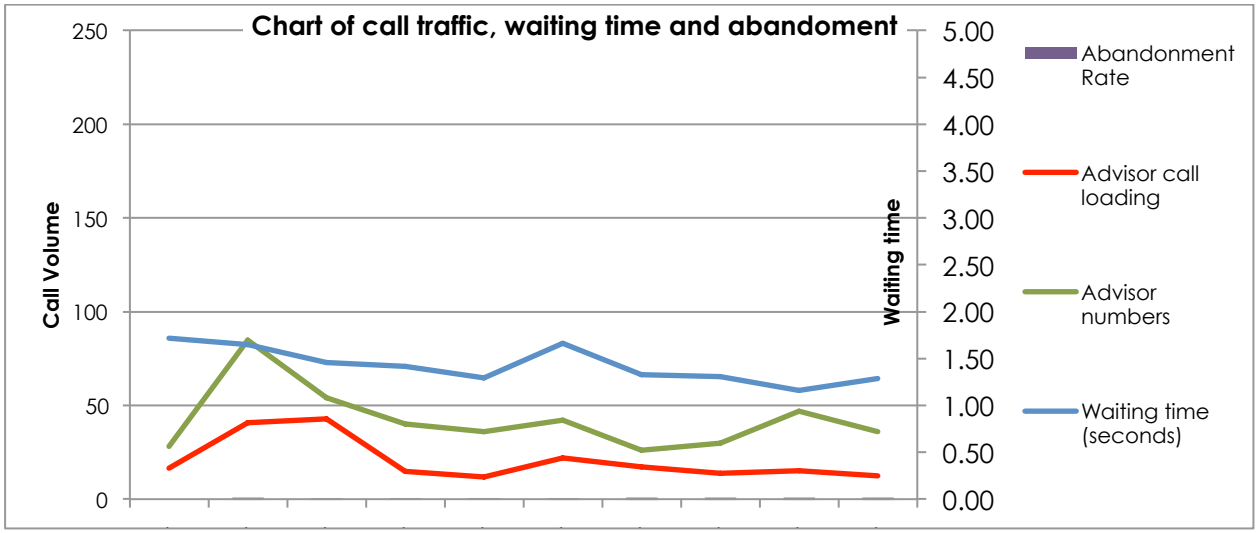


Chart 4 – Association of factors to abandoned calls – South West and South Wales

KM1	8214		KM2/KM1	96%
KM2	7921		KM3/KM1	42%
KM3	3472		KM5/KM1	<1%
KM5	54		Total	N/A

Table 2 – peak total call volume – South West and South Wales – 23 December 2013

Observations

Chart 3 and Table 2 show that 96% of all incoming calls are answered by the IVR and 42% answered directly or via the IVR.

Chart 4 shows waiting time is below 2 seconds with a negligible (just discernable on chart) abandonment rate. The profile of the call loading reflects the call volume.

7 Internal review, evaluation and follow up

7.1 In-house reviews

WPD conducted a full review of events and submitted data to both the Ofgem stage 1 and DECC reviews, together with a follow-up report on 1 May to Ofgem.

WPD's 2014 round of stakeholder roadshows will include a storms review session to gain customers' perspectives and search for further improvements. As a result of its current work with Local Resilience Fora, WPD will be publishing new and simple resilience and communications plans for use during the management of severe weather events. WPD will also be doing something similar for Parish Councils and including a demonstration crisis pack, containing useful items for use during a supply failure.

7.2 Network condition and resilience

Technical standards are set out in the company's Long Term Development Statement for each licensed area.

WPD's distribution networks are designed to ENA standards and, like other DNOs, it has legacy networks inherited from the four diverse area electricity boards/licensed areas that make up the current DNO.

The company does not consider that legacy networks are a significant factor in explaining the differences in supply restoration performance; companies have had some 25 years of autonomy within which to address those issues that they regard as fundamental to the resilience of their networks.

Thus WPD has had programmes of installing network automation and improving its tele-control capabilities to provide an improved service to its customers which are reflected in the year-on-year reduction in CI and in CML. In common with all DNOs, WPD is also improving its network reliability by replacing ageing plant and equipment.

7.3 Learning from others

Along with other DNOs, the company is participating in delivering the DECC action plans and taking forward actions which will further enhance its capability and customer service provision. It has hosted visits from other DNOs, especially around the current application and development of its High Volume Call Taker (HVCT) telephone system and its severe weather escalation practices.

It has not been within scope to undertake a quantitative analysis which compares the performance of WPD's four licensed areas – this is a matter for the company - but qualitatively there has been a step change in the way in which resilience and responsiveness is approached in those licensed areas most recently acquired by WPD[50].

8 Review of performance against success factors

Ref	Activity	Review of WPD's Performance
SF1	Emergency plans and advance preparation	❑ WPD operates its four contiguous licensed areas as a single organisation with support capability between them and therefore has a single set of emergency plans and mode of operation in an emergency. ❑ WPD has plans in place covering all aspects of an emergency event. These plans were externally reviewed as far back as 2002 and have been modified based on event experience and to allow for technological developments on regular basis since then. ❑ In May 2014, under this review, the plans were found to be robust and fit for purpose. ❑ However, WPD operates very much at the low-bureaucracy end of the scale for weather-related emergency response believing that an escalation

[50] WPD acquired Central Networks (the EME and ME licensed areas), formerly owned by E.ON on 1 April 2011.

Ref	Activity	Review of WPD's Performance
		from business as usual to whatever level of activity is required is the most effective for its customers. ❑ WPD's processes rely on clarity of delegation of authority to take what action is required with minimal corporate intervention. ❑ WPD's plans and processes have served its customers well in recent events achieving leading performance in supply restoration. ❑ WPD's approach is considered to be dependent on the leadership team working closely to achieve clear objectives and could be vulnerable if key members of the leadership team changed. WPD has succession plans in place to address this as far as is possible.
SF2	Weather forecasts, prediction of impact and resource requirements	❑ WPD uses the MeteoGroup to provide its forecasts on a daily basis. ❑ These include detailed forecasts for the immediate 4 days ahead and a more general overview for the following 6 days. In addition, WPD has two in-house emergency planning officers who, as part of their responsibilities, review the externally provided short-term weather forecasts and flood warnings. As a result of the DECC review, WPD will also be taking routine longer range forecasts. ❑ The MeteoGroup predicted that, due to the change in direction of the Jet Stream, there would be a period of very unsettled weather across the UK.
SF3	Early reaction and mobilisation	❑ WPD engages the full organisation in escalation, under the banner 'business as usual only more'. The company was resilient over the Christmas period and escalated early in response to the forecast. It strengthened the staffing of control rooms; placing on standby 'ramp up' customer contact centres and home workers ready to take calls out of hours; helicopters on standby, contractors and tree cutters on standby; depots and stores opened early; flood response and specialist equipment on standby; the Red Cross placed on standby. ❑ For the 23 to 28 December event this meant that all affected WPD offices remained open and staffed overnight on from 23 December until late on Christmas Eve.
SF4	System automation to restore bulk customer	❑ WPD has invested heavily in system automation on its SWales and SWest networks and is still doing so on its more recent acquisitions in the midlands. A legacy tele-control system is now fully integrated into the network management system

Ref	Activity	Review of WPD's Performance
	numbers	and automation on HV feeders is widespread. ❑ On its underground networks, WPD has extensive automation minimising CI and CML for system incidents where its systems can detect a faulty section of a feeder and switch-in an alternative source of supply to customers affected by a system incident.
SF5	Telephone response & answering service.	❑ WPD does not have any systems which are specifically activated during emergency conditions. This is a point of principle. The company has systems in use for business as usual which are scalable as volumes build. This minimises the preparatory 'learning' required for mobilisation. ❑ WPD engages non-operational staff during an emergency event. In addition to opening up 'ramp up' centres for taking and making calls (as described in the narrative), WPD has the capability for staff to take calls at home (staff can access relevant HVCD screens and the company's incident management system. WPD provides these people with a laptop and broad band connection). This initiative provides the opportunity to maximise access to resources at times when call volumes are high. (It should be noted that while others are trialling this capability, it is fully operational at WPD). ❑ WPD does not make use of an external provider for handling customer contacts. The company believe business understanding and doing things the WPD way can add to the quality of its customers' experience.
SF6	Gathering field information	❑ WPD supports and supplements information received from its incoming telephone calls with scouts as a means of gathering more informed information regarding network damage, team size and materials required to carry out repair and number of customers expected to be restored by the repair. ❑ This saves valuable time for the critical overhead line repair teams who can progress from one fault repair to the next with some confidence that they have the right materials available and know of any support that is required in terms of special equipment or transport and safety documents. ❑ For its operational staff switching on the network, WPD also has 'field ENMAC units' enabling field operations to be entered direct into the network management systems keeping information as up to date as it can be without occupying voice communication channels.

Ref	Activity	Review of WPD's Performance
		❑ Wherever possible, WPD pairs the scout with someone who is Competent under its Safety Rules to isolate and make safe supplies where a dangerous situation may exist.
SF7	Processing Information	❑ In common with most DNOs, WPD has invested heavily in technology to support the processing of information from the network, from customers and from staff to provide an overall picture of the damage to its networks, the likely work required to carry out repairs and estimate restoration times. The volume of information to be processed is massive and all DNOs are significantly better placed to handle this than they were 10 years ago. ❑ Technology is developing and changing rapidly and there is always likely to be one DNO having a slightly later version of a system than another, or using features differently to link in with other in-house legacy systems. ❑ WPD uses GE ENMAC (converting to Power On Fusion) network management and trouble system and its in-house modified telephony system for logging and processing incoming and outgoing customer calls. All of the systems are linked to ensure network data is available to call takers, and incoming call data automatically links to network data where call line identifier is available.
SF8	Rapid dispatch of switching resource to site	❑ WPD has a rapid response policy to make resources available speedily. At least three people authorised to carry-out high voltage switching are dispatched to any high voltage fault operating under the company's 'Target 60' strategy (80% restoration in 60 minutes). Using the information from its systems described under SF7, the company is able to dispatch resources quickly and efficiently to switching points on the network to deliver maximum benefit to customer supply restoration. ❑ WPD's rapid response teams are equipped with electronic navigational aids also marked up with switch locations to avoid time loss in locating switching points in rural areas.
SF9	Ensure adequate resources in terms of people, transport materials	❑ Overall, some 70% of WPD's networks staff came into work. WPD moved an additional 70 teams into the south west to support the restoration effort (see below). ❑ The company has created a pipeline for workforce renewal that pre-dates the workforce renewal incentive. ❑ Preparedness involved checking stores and

Ref	Activity	Review of WPD's Performance
		logistical arrangements.
SF10	Adequate overhead line staff	❑ WPD holds four distribution network licences all with significant overhead line networks, amounting to 33% of the country's overhead lines. WPD has the highest ratio of linesmen to km of overhead line, with 45km of overhead line per member of staff. ❑ WPD operates a predominantly in-house policy for overhead line staff and employs 59% of the country's directly employed line staff and 7% of contract staff, amounting to approximately 44% of the country's overhead line resource. ❑ Other than in the unlikely event of all four distribution networks being simultaneously severely affected by adverse weather, WPD is therefore well placed to transfer staff between licensed areas without external reference. The movement is eased as the company has moved to common systems and the process is also well practised. Transfers can thus happen quickly and smoothly, as they did in this event. ❑ Overall, the evidence is that WPD reacted and transferred staff early and thereby benefitted from this resource advantage.
SF11	Management of repairs	❑ WPD prioritises repairs to achieve maximum numbers of customers restored to supply in the shortest possible time. ❑ This generally takes the order of highest voltage faults impacting supplies first, working down through voltage levels, followed by restoration of strategic duplicate circuits that have faulted and impose a system risk but are currently not affecting customer supplies.
SF12	Manage the event tail	❑ All customers were restored within 24 hours and 19 minutes. Within the normal use of the term, WPD's early action meant they did not have a 'tail' of customers to restore. ❑ In other circumstances WPD's systems would signal to them customers who had been without electricity for the longest time and, in an extended emergency event, WPD is equipped to monitor the situation so that priority could change from bulk restoration to longest without supply if so required, or more appropriately run in parallel with ongoing bulk customer number restoration.
SF13	Mobile Generation	❑ WPD has invested in mobile generation from 500kVA down, (together with training staff in the installation and operation). This is used extensively as part of the company's restoration strategy. To ensure the plant is as close as practicable to

Ref	Activity	Review of WPD's Performance
		place of need, WPD stations a mix of mobile generator sizes at all of its operational depots. WPD also has a contract with a supplier for additional sets and re-fuelling of both its own and hired-in plant.
SF14	Use of all media channels to communicate with customers	❑ All channels were used. In addition to call handling, there were media briefings and use of social media (a 24 hour Twitter service has been operating since 1 April 2014). ❑ WPD's website has a power cut map. It has a facility for customers to access emergency numbers and look at loss of supply information by post code. The events of this winter have prompted bringing forward a review so that real time outage information can be made available on line. Texts (66940 texts to customers with fault information) and Twitter (337 tweets) were used extensively.
SF15	Provide realistic estimates of repair duration and informing customers	❑ All DNOs recognise the need to give the most accurate estimates of restoration times that they can. Over-optimistic repair times tend to antagonise customers, particularly when not updated and restoration times are not achieved. Equally, unduly pessimistic times are not helpful to customers as there are likely to be instances of customers making alternative arrangements only to find the supply is restored soon after leaving home or incurring expense. ❑ Customers are frequently surprised that after waiting for several hours for information about their predicted restoration (and the DNO not having an answer) that the repairs are ultimately carried out in a matter of minutes from arrival on site. This is the reality of some types of incident.
SF16	Provide feedback to customers with regular updates	❑ Through the linked systems of ENMAC/POF, trouble call and telephony along with feedback from staff in the field WPD provides messages to customers with the same information a call advisor would have available. This is updated with new information each time there is a change of status on repair work. ❑ If there is no change of status the messages are updated on a 3 hourly basis with a latest update time.
SF17	Local presence and community contacts	❑ WPD's delegation of authority to act in an emergency is reflected through the organisational structure adopted. Its commitment to localism is mirrored in the new licensed areas acquired in

Ref	Activity	Review of WPD's Performance
		2011, in that depots/work reporting centres have been acquired. ❑ Prior to the event WPD had pro-actively contacted DECC, Ofgem, WAG, Consumer Focus and Consumer Direct; and at a local level with LRFs.
S18	Provide adequate welfare facilities to PSR customers from start of event and to all customers who are without supply for more than 48 hours	❑ WPD has 878,000 PSR customers. They have access via a dedicated emergency line which ensures priority. During the 23 to 28 December period 1,350 vulnerable customers were pro-actively contacted. The company has a team of 10 dedicated call handlers expert in this work; training is now being extended to all call advisors. ❑ In February 2014 WPD gained compliance to BS18477:2010 'inclusive service provision'[51], the first DNO to achieve this standard.

[51] This standard sets out the requirements for identifying and responding to consumer vulnerability.

Appendix 7 NEWSAC Transfers Winter 2013

The table below, provided by the Energy Networks Association (ENA), indicates the recorded transfers between companies facilitated by NEWSAC through the 2013/2014 winter period. It shows clearly the relative ineffectiveness of NEWSAC over the Christmas period. Even though direct overhead line staff were not fully deployed and contract resource, which had been declared as available to work by some DNOs does not appear to have been made generally available to others.

St Judes Storm 28/29 October			
Companies Providing Resources	Resources Released to UK Power Networks	Resources Released to Scottish & Southern Energy	Total
Northern Power Grid	43	19	62
Electricity North West	17	0	17
Scottish Power Distribution/MANWEB	31	0	31
Western Power Distribution	79	24	103
			213
5/6 December			
	Resources Released to NPG	Resources Released to SP Distribution	
UKPN	20		20
Isle of Mann		7	8
			28
Christmas Storm			
	Resources Released to ENW	Resources Released to UKPN	
Northern Power Grid	14	21	35
			35
St Valentine's storm 13/15 February			

Appendix 8 Independent Network Operators

1 Current position

An Independent Distribution Network Operator (IDNO) is a company, which has been awarded a distribution licence. The typical pattern of development is for a company to build a local electricity network, after which it will continue to own the asset, provide maintenance, ensure a 24-hour fault repair service is in place and deal with PSR customers in much the same way that a DNO would. IDNO networks are directly connected to a DNO network or indirectly to the DNO via another IDNO.

IDNOs are regulated in the same way as DNOs, though the IDNO licence does not have all the conditions of a full DNO licence[52].

There are six IDNOs reported on the Ofgem website; two have the same parent company and one is owned by a DNO and is being reintegrated into the main licence area.

GTC, one of the largest IDNOs owns two IDNO licences, is a subscribing member of the ENA, and on a growth trajectory to reach 300,000 customers in the near future. It employs some 600 staff at sites across the country. This brief summary arises from a discussion between GTC conducted as part of this study.

2 Issues in severe weather events

2.1 Mutual aid and NEWSAC

Small but growing, IDNOs have a technically capable workforce, familiar with industry practice, which could be utilised more fully during times of network stress.

GTC has contacted the NEWSAC co-ordinator with a view to entering into an arrangement, at times of system emergencies, whereby GTC could provide additional resources to supplement the DNOs' own staff and that of their contractors. Even if reaching formal mutual aid agreements takes time, awareness raising among host DNOs might be of some value.

Although there may be commercial tensions to overcome, the inclusion of all-sector participants will be helpful in ensuring the maximum availability of resources during emergency conditions.

2.2 Customer contact

The majority of no-supply calls associated with GTC's customers go to the host DNO in the first instance. This was appropriate during the December storms where the majority of no-supply calls arose because of faults on the host DNO's network. However, dependent upon which host DNO is involved, GTC's customers were either treated as one of the host DNO's own or were re-directed to GTC's call centre, necessitating GTC then trying to contact the host DNO to relay messages to GTC's customers.

GTC already has an agreement in place with WPD under which WPD treats GTC's customers within its four licensed areas as its own, liaising with GTC as necessary in order to ensure there is no double-handling that would give rise to confusion in the

[52] See the Standard licence conditions as published by Ofgem in the 'Standard conditions of the Electricity Distribution Licence – 22 April 2014' . Section A applies to all holders of electricity distribution licences; the section B Additional Conditions does not.

minds of the affected customers. GTC reports that this arrangement works well and is in contrast to the treatment both it and its customers receive from other DNOs.

Over time, it is anticipated that IDNOs' customers will become more familiar with which organisation to contact and IDNOs expect to build up the full range of communication channels with their customers.

During the December storms GTC reports that it had as much difficulty contacting some DNOs as it appeared that the DNOs' own customers did. It cites one particular example where it had to undergo a question and answer session involving several people before it was given information regarding the restoration of supplies to its customers. Even then, the information it was given was erroneous and, having secured a mobile generator with which to connect supplies to its customers, found that the host DNOs' supply was already energised.

2.3 Future

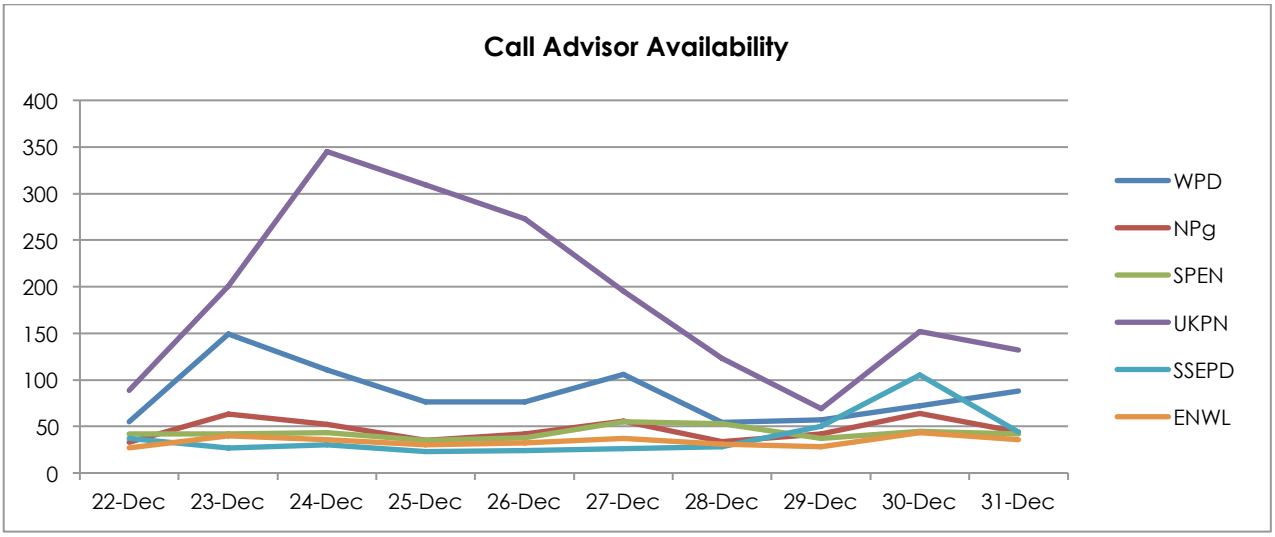
In summary, there are difficulties in IDNOs making contact with some host DNOs during severe weather events and that, subject to resolving any security and data protection issues, there would be advantage in the IDNO having access to the relevant IDNO's network management system screen(s) so that they could provide their customers who do contact them with the most accurate ETRs that are available. It would also facilitate better communication with PSR customers and provide an improved level of service to the IDNO's customers.

In summary, it is considered that there are benefits to be gained all round by facilitating a closer working relationship - in terms of INDOs making available resources under a mutual aid arrangement and the DNOs either providing timely, accurate and relevant information on the situation of IDNO customers.

Appendix 9 Call taking summary of analysis

Total daily DNO contact centre advisors

	22-Dec	23-Dec	24-Dec	25-Dec	26-Dec	27-Dec	28-Dec	29-Dec	30-Dec	31-Dec
WPD	55	149	111	76	76	106	54	57	72	88
NPg	33	63	52	35	42	56	34	42	64	44
SPEN	42	42	43	35	38	55	53	37	45	42
UKPN	89	201	345	309	273	195	123	69	152	132
SSEPD	37	27	30	23	24	26	28	50	105	44
ENWL	27	40	36	30	32	37	31	28	43	36



Measures averaged daily totals over period

Measure	All DNO Average	ENWL	NPg	SPEN	SSEPD	UKPN	WPD
KM1	**7997**	1438	1147	3431	20486	18315	3165
KM2	**4972**	685	371	1639	11486	12779	2871
KM3	**2304**	742	714	1355	3158	6040	1817
KM5	**1294**	11	31	235	3370	4093	23
Advisor call loading	**36**	22	8	30	101	29	21
KM4* (seconds)	**93**	6	14	60	324	294	1
Abandonment rate	**10%**	1%	8%	1%	23%	19%	1%

* weighted average