Review of Major Outages of 2008

Discussion document

Presented at the 4rd Annual Infocast Conference on
Emergency Preparedness and Service Restoration for Utilities

Houston, TX
March 20, 2009

O'Neill
Management
Consulting, LLC
Consultants to the Utility Industry

Over the years, there have been many sources of lessons learned…

Selected Sample of Events

Event Date	Type	Company	Regulatory Response
Jan 1997	Ice Storm	Entergy Gulf States (TX)	Audit, Fine, Get Well
Jul 1999	Heat waves	Com Ed, Con Ed, PSE&G	Audits, DOE POST, Get Well
Jul 2001	Thunderstorm	Indianapolis Power & Light	Audit, Fines, Get Well
Dec 2002 Feb 2003	Ice Storm	Duke Energy, Progress Energy	Audits, UG Study, Get Well
Aug 2003	Blackout	Many companies in Northeastern North America	Congressional study, suits, new NERC rules, etc.
Oct 2003	Hurricane Isabel	PHI (Pepco, Delmarva)	Assessment, UG Study, Get Well
Dec 2003	Snow storm	PacifiCorp (Utah P&L)	Audit, Get Well
Aug-Sep 2004	Charley, Frances, Ivan, Jeanne	FPL, Progress, Southern	Rate recovery proceedings
Jul-Sep 2005	Dennis, Katrina, Ophelia, Rita, Wilma	Entergy, Southern, Progress, SCANA, FPL	Congressional hearings…
Jan, Jul, Sep Jul 2006	Wind storms Heat Wave	Con Ed – Westchester Con Ed – Northwest Queens	Audit…
Jul 2006	Wind storm	Ameren	Audits in IL & MO…
Dec 2006	Wind storm	Puget Sound Energy, Seattle City Light	Audit, assessment…

…And 2008 was no exception

Selected Sample of Events

Event Date	Event Description	Companies hit hard	Customers Affected (000)	Days to Restore
Jan 2	Winter Storms	PG&E	2,600	10
Feb 10	High Winds	AYP, AEP, Dom, Duke	300	0.5 to 4
Feb 26	Transmission failure	FPL	900	0.5
Apr 9	Severe Thunderstorms	Oncor	500	3.5
Jun 10	Severe Thunderstorms	PSE&G, PECO	500	4
Jun 17	Severe Thunderstorms	Oncor	200	2.5
Jul 23	Hurricane Dolly	AEP-TX	200	8
Aug 4	Severe Thunderstorm	ComEd	600	1.5
Aug 19	Tropical Storm Fay	FPL, Progress	600	3.5
Aug 31	Hurricane Gustav	Entergy, CLECO	2,100	2.5 to 9
Sep 6	Tropical Storm Hanna	Dominion, Progress	100	0.5
Sep 12	Hurricane Ike-coastal	CenterPoint, Entergy	3,400	2 to 19
Sep 14	Depression Ike-inland	AEP, FE, AYP	2,400	3 to 8
Oct-Nov	Wildfires threaten trans.	SCE, LADWP, CAISO	600	
Dec 11	NE Ice Storm	Nat'l Grid, NU	1,700	10
Jan 27	MW Ice Storm	E.on, AEP	1,300	7
Feb 12	High winds	AYP, AEP	500	5

Pacific Gas and Electric Company Restores Power to 97 Percent of Customers Following Severe Winter Storms

SAN FRANCISCO, Jan. 7 /PRNewswire-FirstCall/

As California braces for another strong winter storm, more than 600 Pacific Gas and Electric Company crews continue to work around the clock to restore service to customers and repair damage to electrical equipment throughout the utility's northern and central California service territory. Since the first storm slammed into the state with gale-force winds [70 mph] on Friday morning, PG&E crews have restored service to more than 2.2 million, or 97 percent, of the 2.3 million electric customers who lost power.

As of 5:00 p.m. Monday evening, about 81,000 PG&E customers were without power, mostly in the North Coast and Sierra Nevada regions. About 12,000 of the utility's customers without power are in the greater Bay Area, largely in Marin County.

Exceptional storm damage in several areas -- including parts of the northern and central Sierra foothills, the North Coast, Monterey and the Santa Cruz mountains -- has delayed access by crews attempting to assess and repair damage. PG&E has mobilized more than 100 additional contract and mutual-aid crews from as far as Kansas to help restore service as fast and safely as possible in the hardest-hit areas.

"Our crews have rebuilt enough power lines to stretch from San Francisco to San Diego," said Mark Johnson, vice president of electric operations and engineering at Pacific Gas and Electric Company. "We are giving priority to customers who have been without power the longest and to critical facilities such as hospitals, schools, water systems, and telecommunications facilities. As we finish our assessments of the damage, we have begun telephoning customers who remain without power to give them our best estimate of when their service will be restored."

Outages in the hardest-hit areas may last late into the week. New storms expected to hit Tuesday may cause additional outages. Residential customers without power for 48 hours or longer may be entitled to an automatic payment of $25 to $100 for their inconvenience under PG&E's SafetyNet Program. No action is required by the customer. Please visit http://www.pge.com/safetynet for more information.

Wind Damage Leaves Residents Powerless: Allegheny Power Crews Working Round-the-Clock to Restore Power

Friday, February 13, 2009 12:59 PM Cumberland Times-News, MD, By Jeffrey Alderton

First-responders of every kind were out in full force Thursday when high winds continued to batter the region, knocking power out, trees into houses and causing schools to close for lack of electricity.

Allegheny Power met its greatest challenge yet with nearly 300,000 customers out of service at some point during the high-winds event throughout Maryland, West Virginia, Pennsylvania and Virginia. As of 4 p.m. Thursday, 134,000 customers remained without power. "We'll be working round the clock for days to come," said Todd Meyers of Allegheny Power…

Communities throughout the tri-state area coped with weather-related incidents as the result of winds gusting up to 60 mph or greater. Sustained winds were measured from 15 to 40 mph….

Although repairs crews were out in full force, there were no guarantees of a quick return to service. "We're on track for this to be the largest outage we have ever had. It could be 24 to 36 hours to get the bulk of our customers back on, even longer for some of our customers. This will be a round-the-clock effort for some days to come," he said. "It's very challenging. We're doing our best."

In Mineral County, dispatchers at the 911 center were too busy to respond to media inquires, fielding call after call for downed power lines and tree limbs. At Hampshire County, weather-related calls began streaming into the 911 center at about 1 a.m., according to Ron Frye, 911 deputy director. "Lines are down and trees are down throughout the county. Right now we have a brush fire in the Levels area on Jersey Mountain Road," said Frye.

AccuWeather meteorologist Kate Walters said a wind gust at 67 mph was logged Thursday afternoon at the Greater Cumberland Regional Airport. "It will be quite gusty through the night. Tomorrow there will be gusts up to 30 miles per hour and sustained winds in the 10-to-20 mph range," she said.

MLGW completes restoration effort in Hickory Hill

(February 11, 2008, 12:30 p.m.) MLGW completed its restoration efforts in the Hickory Hill area Sunday evening, five days after a deadly storm made its way through Shelby County and other parts of the Mid-South. More than 64,000 residential and business customers were without power in the wake of the storm.

While most residential MLGW customers had power by Saturday, some commercial customers remained without power until Sunday. There may still be a few customers that have private property damage that is preventing them receiving power. Once the necessary repairs are made, power will be restored to these addresses, as well.

Over the next six to eight weeks, MLGW will focus on rebuilding its infrastructure that was damaged in the storm.

"I want to thank our employees for working day and night to restore power to our customers in only five days after such a devastating storm," said MLGW President and CEO Jerry Collins, Jr. "We are also grateful to the out of town crews who assisted us during the restoration period. Most of all, we thank our customers for their patience, attentiveness to safety and the appreciation they've shown to our employees during a difficult process."

Wildfires Ravage Dry Carolinas, Virginia - High Winds, Drought Feed Hundreds of Fires Throughout Area, Burning Homes, Businesses

CONWAY, S.C., Feb. 11, 2008

Smoke fills the sky as wildfires threaten homes in the Walker's Woods area north of Conway, S.C. on Sunday, Feb. 10, 2008. Wind-whipped fires forced hundreds of residents to flee homes and closed highways across the rain-starved Carolinas and Virginia on Sunday. Investigators went to work Monday trying to figure out what ignited hundreds of weekend wildfires that chased some residents from churches and led others to seek them out for sanctuary…

Thousands of customers in the region still had no electricity because of damage caused by the fires and wind. About 60 homes in Conway were briefly evacuated Sunday when a fire sent smoke billowing above the city of about 11,000 people, about 15 miles northwest of Myrtle Beach…

North Carolina's Forestry Service had cited two people for allegedly starting fires in Hoke County. Nearly 57 warnings also had been issued, mostly for improper debris burning, forestry spokesman Brian Haines said. Some fires were blamed on fallen power lines. By midday Monday, North Carolina counted 302 fires that had burned 9,387 acres. It was not immediately clear how many had been contained, Haines said. The biggest had covered 1,200 acres by Monday. "Many are still burning," Haines said Monday. "It was blowing pretty good until about midnight."

State and local officials estimated that more than 100 wildfires burned several thousand acres across Virginia. Virginia "may have some fires still burning but mostly it's under control," said Bob Spieldenner, a spokesman for the Virginia Department of Emergency Management. "We're in much better shape than we were yesterday." Nearly 60,000 western Virginia homes and businesses were still blacked out Monday, Appalachian Power and Dominion Virginia Power reported. Utility officials in the Carolinas said more than 5,000 customers there were still without power Monday.

FPL Announces Preliminary Findings Of Outage Investigation

February 29, 2008 JUNO BEACH, Fla. – Florida Power & Light Company today announced preliminary findings of its ongoing investigation into the cause of an outage affecting approximately 584,000 customers on Tuesday, Feb. 26. While still preliminary, the results of the investigation so far indicate that human error was the primary factor immediately responsible for the event, which began at 1:08 p.m. Eastern Time. A field engineer was diagnosing a switch that had malfunctioned at FPL's Flagami substation in west Miami. Without authorization, the engineer disabled two levels of relay protection. This was done contrary to FPL's standard procedures and established practices. Standard procedures do not permit the simultaneous removal of both levels of protection. During the diagnostic process, a fault occurred and, because both levels of relay protection had been removed, caused an outage ultimately affecting 26 transmission lines and 38 substations. One of the substations affected serves three of the generation units at Turkey Point, including a natural gas unit as well as both nuclear units, which, as designed, automatically and safely shut down due to an under-voltage condition. Also affected were two other generation plants in FPL's system. Total impact to the system was a loss of 3,400 megawatts of generating capacity. "First, I want to reiterate my apology to our customers …,"

FPL President Armando Olivera said. "These preliminary findings address the most pressing questions that have been posed. We are committed to completing a full and thorough investigation, to cooperating fully with the appropriate regulatory agencies and to sharing our findings publicly when the investigation is completed. We will address any issues that are identified in order to prevent a recurrence," Olivera said. "While the investigation is ongoing, to this point we have no indication that there are any deficiencies with the design of our facilities or with our maintenance procedures. However, out of an abundance of caution, we have implemented interim changes governing relay protections to prevent a recurrence," Olivera said.The final account of customers affected by this incident on Tuesday totals 584,000 customers, or 13 percent of FPL's total. Of these, 66 percent had power restored within an hour, 90 percent within two hours and virtually all customers whose service was affected by this event had service restored by 4:30 p.m. …

Storm causes 200,000 outages at Oncor

April 10, 2008 Dallas Business Journal

Storms across Texas caused more than 200,000 Oncor customers, including about 175,000 in the Dallas-Fort Worth area, to lose electricity Thursday. Oncor said in addition to 2,000 of its employees, the company has enlisted more than 2,000 outside contractors to help restore power.

Oncor had initally estimated 180,000 residents were without power, but additional outages caused by the storm as it moved across East Texas and damage to major transmission lines serving the northern part of the Dallas-Fort Worth area pushed the figure higher.

Locally, 175,000 homes and businesses were without power by midday Thursday. Six high-voltage lines serving the Irving, Mckinney, Carrollton areas were on the ground or damaged. Power has been re-routed, but the lines won't be repaired for at least a week, Oncor said.

"As the storm exits our system, we are experiencing more outages and discovering serious damage to critical equipment," Rob Trimble, president and chief operating officer of Oncor, said in a statement.

"This is a significant storm. Oncor is prepared to use all the necessary manpower needed to restore service as quickly as possible" Trimble added. "Because of the damage caused by the storm, it will be Saturday before power is completely restored."

In addition to damage in the Dallas-Fort Worth area, Oncor said it also is working to restore service to Breckenridge, where every major line into the city was either downed or damaged overnight.

"We're asking everyone to be patient and bear with us as we work through a difficult situation to restore power," said Trimble. "Our top priority is the safety of our crews and the public as the restoration moves forward."

At the height of the storm at 6 a.m. Central time, Oncor estimated roughly 250,000 outages overall.

[An estimated 4,000 contractors and employees are working around-the-clock in the Metroplex and throughout the Oncor system to repair damage from a spring storm that brought wind gusts in excess of 70 miles per hour. Outages scattered throughout the Metroplex were caused by high winds, downed poles, lines, and transmission towers that serve primarily the northern half of the Metroplex. – ONCOR]

Ice storm paralyzes parts of New England, close to a million without power

December 13, 2008, By David Abel and John R. Ellement, Boston Globe Staff

Nearly a million homes and businesses in New England are facing a weekend without electricity after a rare combination of low pressure, moist air, and cold, powerful winds produced a punishing ice storm that swept through the region yesterday, felling countless power lines and trees and closing hundreds of roads…

In Massachusetts, 270,000 customers were still without electricity at 8:30 last night. In New Hampshire, which also declared a state of emergency, more than 400,000 homes and business were in the dark. "We're telling people to hunker down for the weekend, said James Mannion, a spokesman for the Massachusetts Emergency Management Agency, last night.

In Maine, 200,000 lost power, according to the state's emergency management agency. Connecticut Light & Power reported that nearly 17,000 of its 1 million customers lost service. In Vermont, at least 36,000 utility customers lost electricity, and power went out for about 6,000 National Grid customers in Rhode Island. "What we're seeing is unprecedented in terms of New Hampshire storms," said Martin Murray, a spokesman for Public Service of New Hampshire, which provides electricity to about 72 percent of the state. "We've never had any power outages approaching this. Virtually every part of the state is affected, and the damage is extensive."

With work crews in the region overburdened, New Hampshire and Maine sought help from Canada. "It's just a massive task, and there isn't a lot of mutual aid available," said Lynette Miller, a spokeswoman for the Maine Emergency Management Agency. National Grid, which serves 1.2 million customers in Massachusetts, had more than 650 crews working around the state to repair power lines, and they called in help from as far as Washington, D.C., and Ohio. "This is an extreme situation," said Debbie Drew, a spokesman for National Grid. "This will be a multiday restoration effort."…

"There's tons and tons of debris out there, which is impacting the utilities' ability to restore power," said Peter Judge, a spokesman for MEMA. "It's as bad as we've seen at least over the last 10 years."

[Note: the Boston Globe does not mention the additional outages in upstate NY]

O'Neill Management Consulting, LLC

New England/NY Ice Storm

The December 2008 ice storm of New England and Upstate New York was a damaging ice storm that took out power for millions of people in those regions. The storm was deemed the worst ice storm in a decade for New England and the most severe in 21 years for Upstate New York. Damage was primarily a result of fallen trees and fallen utility wires and poles, which were coated in a heavy layer of ice. The storm raised heavy controversy over the slow return of power as at the storm's peak, as many as 1 million customers were without power. Days after the storm more than 800,000 customers were still without power. Almost a week after the storm still more than 100,000 customers were without power, affecting the holiday shopping season and crippling the business and transportation of many northeast cities for days

The storm resulted in a state of emergency being declared by Governor David Paterson in sixteen counties in New York. Up to 300,000 utility customers lost service in New York's Capital District. By Sunday evening, 14 December, 126,000 were still estimated to be without power.

In the Commonwealth of Massachusetts up to one million residents and businesses lost power due to the storm, causing Governor Deval Patrick to declare a state of emergency and mobilize at least 500 national guardsmen to help the clean-up efforts.

Likewise, governors John Lynch of New Hampshire and John Baldacci of Maine also declared a state of emergency and as of 13 December at least 400,000 customers were without power in New Hampshire and at least 172,000 were without power in Maine. This total in New Hampshire was more than five times larger than those who lost power in the ice storm of 1998, previously the most devastating storm on record.

It has also been reported that over 30,000 customers were without power in Vermont and up to 3,700 were without power in Connecticut.– Wikipedia

Trees down, power outages reported

February 12, 2009 By DAVE GOSSETT, For The Weirton Daily Times

High winds left downed trees and power outages throughout the area and residents can expect to see wind gusts up to 66 miles per hour today before "a very intense low pressure system moves north later tonight," officials said. According to Lee Hendricks, a meteorologist with the National Weather Service in Moon Township, Pa., wind gusts overnight were more than 60 miles per hour at times. "We even had a report from West Miflin of wind gusts hitting 92 miles per hour. But we have no reports of tornado activities or microbursts in the Jefferson County area," said Hendricks. "The high wind warning will remain in effect until 7 p.m. today and the Ohio Valley can continue to expect 20 to 25 mile per hour winds throughout the day with gusts hitting 50 miles per hour. The winds really won't start to tail off until late tonight," advised Hendricks.

Allegheny Power reported this morning there were outages …, according to the Allegheny Power Web site."I know the power company contractors are already here to start working on trees down on power lines. I saw the tree cutters going through Steubenville earlier this morning," …Road and street crews were busy today clearing downed trees and branches in local communities.

Randy Payne, a spokesperson for the AEP said early today he did not yet have an estimated time for the restoration of power in Jefferson County. Across the state, about a quarter million residents were without power early today. "We will have an Ohio storm call today and will assess the entire state. At that point, our officials will determine where the worst areas are located and where we need to send our crews. We will have a better idea of what we are looking at once it is fully daylight," stated Payne. "We had a variety of problems from this storm. We have broken transformer poles, trees and branches down on our power lines and some lines blown down by the high winds," added Payne. Severe winds throughout the state are causing power outages to all parts of AEP Ohio's service territory. Outage totals, including the number of customers affected, are expected to increase as weather conditions continue. The AEP Web site noted today hardest hit areas included Columbus and surrounding communities, as well as the Chillicothe, Chesapeake, Portsmouth, Ironton and Marietta areas.

Ice storm hits AR/KY/OH/WV

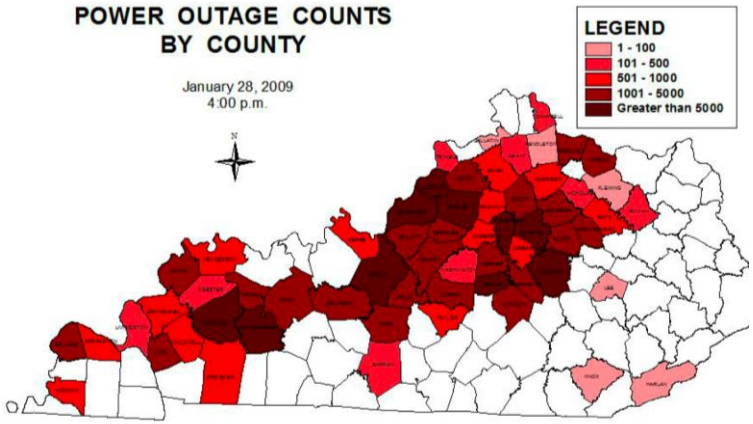
Update: Ice Storms Cut Power to Over 1.3 Million Customers Across U.S. Midwest January 27-28

Snow and ice storms across the U.S. Midwest knocked out power to approximately 1,313,015 customers in states from Oklahoma to Pennsylvania. Heaviest hit states include Arkansas, Kentucky and Ohio with officials at E.ON U.S., which owns Louisville Gas and Electric as well as Kentucky Utilities Company, still assessing the damage the number of customer outages continues to grow. As of most recent reports, the number of customers without electric service across the U.S. Midwest remains over 1 million. The following table lists peak and latest report outage figures, based on multiple sources.

U.S. Midwest Customer Outages
January 27-28, 2009

Electric Utility	State	Peak	Latest Reported
Arkansas Electric Cooperatives	AR	300,000	187,000
Entergy Arkansas	AR	110,324	106,403
AEP SWEPCO	AR	59,000	47,703
Kentucky Utilities	KY	176,000	176,000
Louisville Gas & Electric	KY	100,000	100,000
AEP Kentucky Power	KY	32,372	32,372
Duke Energy	KY	17,445	7,448
Owen Electric Cooperative	KY	14,308	14,308
AEP Ohio	OH	124,118	124,118
Duke Energy	OH	42,626	34,156
South-Central Power	OH	27,912	25,471
Duke Energy	IN	67,797	44,298
Jackson REMC	IN	4,000	4,000
Missouri Electric Cooperatives	MO	63,000	63,000
Ameren	MO	35,964	35,692
Appalachian Power	WV	46,217	45,979
Allegheny	WV	7,644	7,644
Oklahoma Electric Cooperatives	OK	38,788	25,326
OG&E	OK	10,500	2,761
AEP Oklahoma	OK	1,500	0
Ameren	IL	11,772	6,994
Appalachian Power	VA	8,829	8,829
Knoxville Utilities Board	TN	6,589	32
Allegheny	PA	6,310	6,310
TOTAL*		1,313,015	1,105,844

*Total outages only represent electric utilities listed in this table.



O'Neill Management Consulting, LLC

Observations and Key Questions

Observations

- Post-storm audits are full of insights into what can go wrong, and what is expected in terms of methods and processes
- Pre-storm plans are often available and should be compared
- Lessons learned are often shared and contain gems of insight for your own operations. Likewise, you can learn by sharing your lessons learned from major events

Key Questions

- Have you read the post-storm audit reports relevant to you?
- Do you have up-to-date copies of the emergency plans of other companies?
- Have you prepared and shared your lessons learned with others, and listened to others who have done the same?

Questions?

Dan O'Neill
President and
Managing Consultant

O'Neill Management Consulting, LLC

404-603-9226

dan@oneillmc.com

Doing the same thing over and over again does not lead to improvement. Measure, document, share and compare in order to get better