PECO
2013 Summer Readiness Overview
June 28, 2013

Summer is here and PECO is ready. PECO bases its readiness on its reliability enhancement programs, preventative maintenance programs, and capacity planning. In addition, PECO initiated its summer preparedness programs and procedures which incorporated key lessons learned from 2012 severe weather events.

1. PECO's Keys to Success

a. Reliability Enhancement Programs

PECO has several reliability enhancement programs that are significant contributors to the company's successful performance. Under the Top Priority Circuits Program, PECO analyzes at least five percent of the system's worst performing circuits on an annual basis. The company takes steps to improve reliability by installing reclosers for distribution automation, identifying and repairing problems via visual and thermographic inspections, increasing vegetation management activities, installing and upgrading fuses, and replacing cable and other equipment. Selected underground cables were replaced in Philadelphia and the suburban regions to reduce digging and repair costs and reduce cable-related service interruptions.

Through Distribution Automation, PECO installed nearly 400 three-phase reclosers in automated loop schemes during the last four years, bringing the total to more than 1,500 reclosers. These reclosers automatically reduce the numbers of customers affected by outages and restore service to sections of circuits where repairs are not needed. Reclosers were primarily installed in Chester, Delaware, Montgomery and Bucks Counties, with selected circuits addressed in Philadelphia and York Counties.

Additionally, PECO has made improvements to its transmission system and substations. PECO upgraded equipment and added monitoring and control capabilities at Cromby and Eddystone substations, rebuilt a 138-kV transmission line in Montgomery and Delaware Counties, and began construction of a new 500-kV transmission line between PECO and PP&L.

PECO's ongoing Smart Grid investments enhance reliability through microprocessor-based relay upgrades, fiber optic communications among substations, disturbance monitoring equipment across the transmission system, and modern computer systems for outage management (OMS), geographic information (GIS), and distribution system real-time management (DMS).

b. Preventative Maintenance Programs

PECO routinely performs numerous preventative maintenance programs including, vegetation management, pole inspections, distribution overhead line inspections, distribution transformer inspections, recloser inspections, and substation inspections. Preventative maintenance programs have been completed every year since the Commission's quarterly reliability reporting began in 2003.

Comprehensive vegetation management preventative maintenance programs are completed on distribution circuits and on transmission lines on a five-year cycle, protecting the transmission and distribution systems from vegetation-related interruptions. Visual and thermographic inspections of overhead distribution lines lead to identification of items to repair before an outage occurs. Three-phase reclosers are inspected on a regular basis to ensure the distribution automation system is ready to automatically locate and isolate problems and restore service to customers.

c. Capacity Planning

As part of PECO's distribution capacity planning for this year, all circuits were analyzed with data from the previous summer, and 13 projects were designed and completed to address items found in that review. Peak load and possible under frequency conditions were assessed leading to updates to the load shed database and lists of locations to block automatic load transfers. Additionally, training was performed so that employees can take peak, day readings at substations where there are no automated load readings.

2. 2012 Storms and Lessons Learned

2012 was a relatively light year for PECO, at least in the number of storms. Despite a smaller than normal number of significant storms through the year, PECO was hit by Hurricane Sandy, the largest storm in PECO's history by far. For comparison, Hurricane Irene from 2011 was PECO's third worst storm prior to Sandy, with more than 511,000 outages. Sandy set a new benchmark for storms in PECO's territory, affecting more than 850,000 customers. Sandy caused approximately 3500 primary events, 90% more events than Irene.

Additional comparisons of equipment replaced during Sandy and Irene:

- Cross Arms – 2,875 (37% increase)
- Fuses – 16,522 (31% increase)
- Poles – 750 (141% increase)
- Transformers – 390 (57% increase)
- Wire and Cable – 141 miles (60% increase)

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Despite the devastation, PECO provided an impressive response to Sandy and restored power quickly to the great majority of our customers. The table below outlines PECO's rapid recovery:

	Number and Percentage of Customers Restored	
Restored within 24 hours of outage	547,400	64.40%
Restored within 48 hours of outage	703,205	82.73%
Restored within 72 hours of outage	788,375	92.75%
Restored within 7 days of outage	849,830	99.98%

After every major storm event, PECO conducts a formal "lessons learned" to evaluate the elements of our planning and response efforts and determine which worked well and others that need to be improved. As part of this comprehensive review, PECO conducts outreach to customers and other stakeholders, including municipal and county officials, as well as state-elected officials. After Sandy, PECO helped initiate an industry-led, PUC-sponsored, Best Practices assessment of Pennsylvania utilities. This extensive collaborative effort continues.

In the post-Hurricane Sandy, PECO identified several successes, including our advanced planning and preparations of our system, crews and employees; advanced planning to contractors and mutual assistance networks to secure additional utility resources and to have those crews in place prior to the storm; successes in implementing the enhanced road-closure process developed during Hurricane Irene; and pre-storm communications with employees and customers regarding preparation activities and post-storm communications about restoration efforts.

PECO's post-Hurricane Sandy review generated several lessons learned, one of which was the need for further enhancements to the road closure process, despite the successes of the new program. New emergency response roles, computer codes, and reporting have been developed to enhance reporting and communications with the County 911 Centers for future events.

Another lesson learned centered around the management of customer expectations regarding Estimated Times of Restoration (ETRs). The Pennsylvania utilities Best Practices teams highlighted a potential opportunity to improve the accuracy and communication of ETRs and better manage customer expectations during large events, such as Hurricanes Sandy and Irene. Consistent with various Pennsylvania utilities, PECO may temporarily suspend the process of developing estimated times of restoration (ETRs) in the early stages of a large event. This will allow time for PECO to effectively assess the damage to the service territory and ultimately improve the accuracy of ETRs. PECO also has made improvements to the communication of this practice to customers

and stakeholders prior to and during storm events. Additionally, Metrics have been developed to measure the accuracy of ETRs and the number of ETRs generated for a particular outage. This last metric is designed to help address concerns expressed by customers receiving multiple ETRs. While multiple ETRs cannot be avoided entirely due to "nesting" of outages (multiple damaged areas on the same circuit), which cannot be readily identified until PECO personnel are able to complete a thorough walk-down of every damaged circuit, measuring the number of ETRs provided for an outage may identify opportunities for improvement in our communications with these customers.

PECO has upgraded the information available on our website to show the number of outages within a municipality, to help municipal officials obtain information, and to communicate with local residents.

Another lesson learned in the communications arena was the need to expand the company's use of social media as another conduit to communicate to customers and officials. Since Sandy, PECO has developed a social media communications plan, including a team to manage social media issues during emergencies. The company is now utilizing both Twitter and Facebook channels.

A more tactical process improvement was to develop a more effective way to communicate outage information, locations, and circuit configurations to restoration crews. Historically done by utilizing distribution of "hard copy" paperwork, the company has developed the ability to email this information to restoration crews that have the capability to receive emails. This ability has been recently practiced at PECO, and will be implemented to the highest degree possible in future events.

PECO is continuing to find ways to expedite vehicle permits for interstate travel for emergency restoration purposes (such as for mutual assistance crews and the like). Declarations of Emergency and waivers help tremendously in this area, and PECO will continue to work with the All-Hazards Consortium, government officials, and others to further expedite the process during future events.

3. PECO's 2013 Summer Readiness

More than 35 projects have been completed this year that are essential to meeting the increased demand customers place on the electric system to keep their homes and businesses cool. This work includes the installation of substation equipment upgrades and new transmission wires and poles. PECO also has completed projects to increase neighborhood electric supply, inspected circuits and equipment, and completed numerous additional jobs to ensure reliable service for the company's 1.6 million electric customers this summer.

In addition to larger projects, PECO's summer preparedness program includes inspecting and maintaining aerial and underground electrical equipment, substations and other facilities; upgrading, replacing and repairing equipment to meet customer needs;

emergency response drills and other training for employees; and maintenance and testing of various computer and support systems.

a. Capacity Additions

PECO completed numerous capacity addition projects that enhance our 2013 summer readiness. Some of our major projects include the following:

- 220-02 & 220-31 Line Upgrades Planebrook to Bradford- $4.7M
  2013 system conditions confirmed the need for the projects to increase the capacity of the 220-02 & 220-31 transmission lines from Planebrook to Bradford substations. The line upgrade projects reinforced the system and avoided a total replacement of the transmission line and structures.

- 130-35 Line Upgrade Project- $18M
  This project addressed potential emergency capacity issues on the 130-35 line. In an effort to mitigate any potential reliability issues, a significant portion of the transmission line was replaced between the Plymouth Meeting substation and the Bryn Mawr substation.

- Emile 190 Breaker Upgrade Project-$1.0M
  This project included upgrades to a 138kV circuit breaker at the Emilie substation in order to increase the capacity and electric reliability for the surrounding area.

b. Supplemental Vegetation Management Preventative Maintenance Activities

PECO's Vegetation Management department schedules a backshift of tree crews during the summer months (i.e., June through September). These crews are available to respond to emergency situations in a timely manner during the peak tree growth season. Vegetation Management completes an annual ground patrol of electric transmission lines and completes all identified emergent work before June 1 each year. In addition, distribution corrective maintenance work is identified before June 1 each year for circuits that qualify for mid-cycle and 34-kV programs.

c. Employee Preparations

PECO's Annual Summer Readiness Program also includes emergency response drills and other training for employees, including, but not limited to: training and summer equipment preparations; training for PECO's AC Saver program; employee review of personal protective equipment; inspection of all buildings and substations for summer readiness; and maintenance and testing of various computer and support systems. Extensive drills, covering the entire PECO Storm Organization, were conducted in May and were observed by a number of PA Pennsylvania Public Utility Commission representatives.

d. Event Preparedness

The 2012 lessons learned were incorporated into PECO's Annual Summer Readiness Drills for 2013. All emergency response teams participated in drills prior to storm season. The drill included the following elements: (1) substation fire, with participation by the local fire company at Croydon station; (2) environmental; (3) security (suspicious package found in substation); (4) load shed; and (5) road closures. Additional separate drills for specific events were conducted, including blackout restart, electronic work packages, and a "substation-based" restoration methodology utilized to focus on concentrated areas of devastation (a methodology utilized in several locations during Sandy).

e. Transmission and Substation Preparedness

PECO's transmission and substation preparedness included the following: review of summer readiness procedures with substation inspectors; completion of summer readiness preventative maintenance; identification and completion of corrective maintenance at critical substations including generating substations; identification and completion of corrective maintenance on transmission lines; annual sump pump maintenance in substations; verification of spare equipment availability including mobile transformers and portable units; completion of the Summer Operations Task Force Summer Study with PJM; and communication to control room staff the findings of the Reliability First Corporation (RFC) Summer Resource and Summer Transmission Assessments.

f. Transmission Planning

Transmission Planning, in collaboration with PJM Interconnection LLC (the regional transmission planner), conducted look-ahead planning studies in 2008 for 2013 and continuously updated the results in subsequent years prior to 2013. All required transmission needs for the PECO system to meet the reliability standards and criteria of the industry, the region and the company were identified and constructed as an integral part of PECO's summer readiness program. These summer critical projects are completed to assure that the load can be reliably served throughout the 2013 summer period.

4. Storm Response

a. Storm Preparations

Once a potential storm is identified, PECO initiates its pre-event planning and preparations. PECO's Emergency Preparedness team implements a "graded approach" for crew mobilization as the potential for storm-related damage in the service territory increases. For anticipated significant weather events, such as with Hurricane Sandy, PECO initiates pre-event planning and preparations days before the events.

As part of its preparations, PECO identifies the need and secures additional personnel to supplement PECO's resources for restoration and tree trimming. Additional personnel can be obtained through approved contractors and resources through mutual assistance organizations in which PECO is a member: the Mid-Atlantic Mutual Assistance partnership (MAMA), and the Southeast Electric Exchange (SEE), and PECO's sister companies (Commonwealth Edison and Baltimore Gas and Electric).

Another key component of PECO's storm preparedness is communication and outreach. PECO conducts interviews and briefings with the media to discuss storm preparations, planning and customer outage expectations. Additionally, PECO conducts outreach with elected officials and local governments, state regulatory and elected officials, and municipal and county governments. Particular attention is paid to the county 911 centers and emergency responders to ensure coordinated preparations and PECO employee staffing at 911 centers when appropriate.

b. Outage Restoration Strategy

PECO follows an overall system restoration priority strategy which results in the most effective way to restore service to all customers who are geographically dispersed throughout PECO's territory.

For all severe weather events, PECO's first step in its restoration strategy is to ensure that the general public and field crews are safe. For instance, during both Hurricane Sandy and Irene, PECO suspended restoration efforts while wind warnings were in effect.

PECO's next step for addressing outages is to target restoration to any impacted transmission lines and substations, to restore capacity within the affected area. Then any possible switching to re-route power to customers is performed. PECO then evaluates the remaining primary outage event list, and dispatches repair crews in descending order of the number of affected customers, simultaneously prioritizing "critical care customers," such as police and fire stations, hospitals, nursing homes, public water and sewer facilities, and communication systems. In this manner, repairs are performed that will restore service to the largest number of customers in the least amount of time, while still addressing the "critical care customers" as quickly as possible. PECO then restores power to smaller outages within neighborhoods and individual services.

c. Communication and Outreach

PECO believes customer communication before, during and after a storm event is critical. The company conducts regular outreach with various stakeholders through all available communication channels, including: the media; the Call Center; the automated phone system, which provides customers with storm and restoration status information and an ETR through an up-front Interactive Voice Response (IVR) message; Storm Central, a dedicated section of PECO's website that provides updates on restoration and a link to the company's outage map which provides outage and restoration numbers by

county and township; and the PECO Smart Mobile On-the-Go application that allows customers to report an outage, check their service status, and pay their bill using a mobile device.

In more severe outage events like Hurricane Sandy, PECO makes proactive calls to those customers that are expected to experience the most extended outages. These calls are to alert them to the anticipated outage duration so they can make any necessary plans.

Another important vehicle for communicating with our customers and other stakeholders is the media. For instance, during Hurricane Sandy, PECO conducted more than 800 media interviews and issued several news releases, providing updated service restoration, outage and customer safety information.

In addition to traditional media, PECO began to utilize social media as an additional vehicle to communicate with stakeholders. PECO launched branded Twitter and Facebook channels in the spring of 2013 and regularly updates these outlets with company news, safety messages and community involvement information. During storms, PECO will use social media to provide emergency contact information, outage reporting procedures, restoration updates, and safety tips.

PECO also maintains close contact with elected and regulatory officials through personal outreach and regular follow-up communication. For example, during Hurricane Sandy, PECO was in continuous contact with the PUC Commissioners and key staff through daily statewide conference calls, ad hoc outreach, several PUC visits to the storm center and service territory, as well as daily routine reporting on storm status. In addition, calls were made to each state legislator in the service territory's Harrisburg and district offices and the district offices of Southeastern Pennsylvania members of Congress.

Outreach also is made to local municipal officials and to the emergency responders in PECO’s service territory. PECO also utilizes regular email updates and a text alert system for municipalities to provide information about restoration efforts and the number of overall and municipality-specific outages.

Finally, PECO's communications include continuous contact with the company’s own employees through regular email and broadcast voicemail updates from the Emergency Response Organization. These messages ensure that employees are fully aware of the extent of the storm and the restoration process, as well as providing a continual channel to emphasize employee safety.