



Duquesne Light Company
2017/2018 Storm Response
and
2018 Summer Readiness

May 24, 2018

Duquesne Light Company (Duquesne Light or Company) provides safe and reliable electric service to more than 590,000 customers throughout parts of Allegheny and Beaver Counties in southwestern Pennsylvania, including the City of Pittsburgh.

Duquesne Light customers experience electric service reliability that is among the best in Pennsylvania, however, occasional severe weather and other emergency events occur, and service interruptions are unavoidable. When those interruptions occur, Duquesne Light relies on its comprehensive service restoration program to restore service safely and timely. Some of the more significant preparedness initiatives to ensure this high level of service reliability are detailed below.

A. Reliability Enhancement Programs

a. Enhanced Vegetation Management

Duquesne Light's Vegetation Management Department is executing its Rights-of-Way Vegetation Management Maintenance Program with the goal of reducing tree and branch failures through proactive tree pruning, and tree removal to increase clearance distances for identified portions of Duquesne Light's distribution facilities.

b. Storm Hardening

Duquesne Light believes that the Rights-of-Way Vegetation Management Maintenance Program will help to shorten the duration of outages by addressing targeted tree failure conditions that typically result in physical damage to the Company's distribution facilities.

c. Fuses/Reclosers/Automatic Switches

Duquesne Light's 23kV distribution circuits utilize 1,086 automatic 3-phase sectionalizers and reclosers that divide each circuit into distinct load blocks of approximately 250-600 customers each. This is an increase of 8 devices beyond replacements. These devices automatically isolate a downstream fault on the main feeder without causing outages to upstream customers. This action minimizes the number of customers that are affected by each outage. In addition, open tie devices are utilized between circuit load blocks that provide an alternate feed to the customers in each load block, which can maintain power in parts of the system while repairs are made on different sections.

Circuit laterals fed from the main feeder are generally protected by single-phase fuses that coordinate with the 3-phase feeder devices to protect the main feeder and limit outages to a very small number of customers.

As of May 2017, Duquesne Light has 104 circuits that utilize pulse-reclosing fault protection and coordination which tests a circuit for a fault condition without applying fault current. All pulse-reclosing has been implemented on 83 circuits and partial pulse-reclosing has been implemented on 21 circuits with sectionalizer/reclosers without pulse-reclosing capabilities. This reduces the damage that can occur on a circuit during a fault sequence compared to traditional fault reclosing and makes circuit repair and restoration faster.

d. Smart Grid

Sectionalizers and reclosers used on Duquesne Light's 23kV distribution system are continuously monitored over a wireless network to its centralized Distribution Operations Center (DOC). Circuit problems are immediately tied to alarms that go off at the DOC where operators quickly take action to relieve overloads or isolate faults and reroute power to customers on non-faulted load blocks. Generally, when an outage occurs, DOC operators have the actual fault isolated from the rest of the circuit and all downstream customers are restored within five minutes. This automation and remote monitoring also helps operators pinpoint the actual faulted load block so field crews can be directed to the failure location more quickly in order to begin repairs.

e. Conservation Voltage Reduction (CVR) Activity

Duquesne Light is not currently participating in Conservation Voltage Reduction (CVR) activities.

The standard configurations of the Company's automated 23kV and 4kV capacitors provide many of the advantages of CVR with their localized controls. Duquesne Light configures intelligent capacitor controls to switch capacitors on or off depending on localized voltage levels. The use of voltage only configurations normally results in providing maximum Var support without exceeding voltage standards. This maximum Var support often supplies excess Var flow back towards the station allowing the tap-changing transformers at the station to regulate to a lower step since the transformer, and eventually the transmission system, are not burdened with the need to provide additional Var support to the distribution circuits.

B. Preventative Maintenance Programs

a. Capacitor Inspections

All line capacitors are inspected both visually and with the use of infrared technology as part of our overhead line inspections every five years.

b. Vegetation Management

Duquesne Light professionally manages a comprehensive Vegetation Management Program utilizing industry best management practices to provide safe and reliable distribution service. This program is specifically defined for the management of vegetation on Duquesne Light's rights-of-way (ROW) for the dependable operation of its distribution (4kV, 23kV, and 23TkV) and transmission (69kV, 138kV, and 345kV) system and includes:

- i. Select tree pruning and removal within the ROW accomplished through ground based as well as aerial means;
- ii. Hazard tree assessment and the removal of defective, dead, or diseased trees within or along the ROW; and
- iii. The selective mechanical and/or chemical control of incompatible tall-growing brush within the ROW. Specific methods for line clearance are chosen based on the type of work involved while achieving it in a professional, economical, and environmentally sound manner.

c. Substation Inspections

Duquesne Light inspects each distribution substation twelve times annually. The purpose of the substation inspection is to identify any emerging issues within the substation so that they can be corrected in a timely manner.

d. Aerial Patrols

- i. Comprehensive visual inspections are performed on specified transmission structures (entire transmission system inspected over a 6 year period). A CVI is useful for identifying the following conditions: corroded insulator hardware, broken/damaged insulators, missing cotter pins, damaged crossarms, vegetation creep on tower legs, damaged static wire or conductor, etc.
- ii. Annual transmission vegetation patrols focus primarily on vegetation, but additionally report any conditions found on equipment or encroachments. These patrols concentrate on vegetation management issues and include personnel from Duquesne Light's Vegetation Management Department in the helicopter in addition to a contracted observer. These inspections normally occur at a slightly higher elevation and speed than the comprehensive visual inspections.

e. Infrared Inspections

Duquesne Light identifies approximately one fifth of its distribution circuits each year for inspection. A two person crew typically drives each circuit (walking the ROW portions) and records the information generated from an infrared camera. Upon returning to the office, any visual observations, infrared pictures, and digital photos are noted and downloaded. A work order is created in the Company's Work and Asset Management (WAM) software to track and address any deficiency or repairs needed. Each deficiency is assigned a priority based on the condition and type of equipment identified. A report, including any pictures, a description of each deficiency item, and the work order are then sent to the Transmission & Distribution (T&D) field personnel to schedule repairs.

C. **Capacity Planning**

Duquesne Light annually performs an individual company assessment of the Duquesne Light area bulk electric system for the upcoming summer period. The summer seasonal assessment of local facilities ensures that the system can supply projected customer demands and projected Firm Transmission Services in accordance with Duquesne Light's local reliability standards. The complete analysis addresses Duquesne Light's transmission performance for the 2018 summer forecasted peak load of 2872 MW. Included in this assessment are firm transmission upgrades.

Duquesne Light also participates in the PJM Interconnection, LLC (PJM) Operations Assessment Task Force (OATF) summer study and the ReliabilityFirst Corporation (RF) summer seasonal assessment. The OATF and RF studies have been completed and Duquesne Light's internal analysis is conducted annually. Based on the OATF and RF results and the preliminary Duquesne Light results of the system conditions modeled in the assessment of the 2018 summer period, the Duquesne Light bulk electric system is expected to sufficiently support the projected peak load under normal operating conditions.

Individual circuit load forecasting, along with bulk substation forecasting and contingency analysis are performed by the Distribution Planning Group on an annual basis. These planning tools are used by Distribution Planning to review loadings of distribution circuits and stations. Any capacity issues discovered during this process are addressed through engineering scopes of work along with any necessary Business Case documents in an effort to allocate funding and resources to address capacity issues.

D. 2017/2018 Storm Update and Lessons Learned

As in past years, Duquesne Light continues to hold internal storm review meetings following all major outage events. These meetings bring representatives from each of the areas involved in the restoration effort together to openly discuss the successes and improvement opportunities of the most recent emergency service restoration effort. Following these storm review meetings, any identified service restoration process improvements are then implemented, as needed, to continually improve response time and restoration effectiveness.

E. 2018 Summer Readiness

a. Capacity Additions

Duquesne Light's capacity additions within the past year on the Distribution/Subtransmission System are as follows:

- i. Portions of circuits that had previously been served by 4kV step-down transformers off of 23kV circuits were converted to eliminate the step-down transformers and serve the load from a 23kV source. These circuits include portions of the following circuits:
 1. Chess D23688: approximately 488kVA converted from 2.14/4.16kV to 13.2/23kV;
 2. Montour D23676: approximately 558kVA converted from 2.14/4.16kV to 13.2/23kV;
 3. Pine Creek D23713: approximately 205kVA converted from 2.14/4.16kV to 13.2/23kV;
- ii. A new circuit, Dravosburg D23754 was established to provide overload relief to adjacent Dravosburg circuits allowing additional load transfer capability for Homestead distribution circuits and provide capacity for new business in Hazelwood;
- iii. The following circuit were upgraded from 4kV to 23kV:
 1. Aliquippa, circuit #4725 converted to Crescent, circuit D23663 & Raccoon circuit D23622
 2. Aliquippa, circuit #4721 converted to Crescent circuit D23663
 3. Aliquippa, circuit #4722 converted to Crescent circuit D23663 & Raccoon D23623

4. Aliquippa, circuit #4723 converted to Crescent circuit D23663
- iv. Aerial cable rehabilitation projects were completed for the following subtransmission circuits:
 1. B.I. – Bellvue No. 2, circuit #22450
 2. Wilson – Lewis Run, circuit T22238
 3. Rankin – East Portal, circuit T22019
- v. The North Shore Rehabilitation Project has been completed which has affected the following circuits:
 1. B.I. D23698
 2. B.I. – Heinz, circuit #22071
 3. B.I. Network Feeder 44, circuit #22304
 4. B.I. Network Feeder 55, circuit #22315

These circuits will experience greater reliability and capacity due to the installation of new conduits and conductors throughout the North Shore area.

Duquesne Light's Transmission Planning group, along with PJM, continues to evaluate Duquesne Light's transmission system to identify system enhancement projects.

b. Transmission Preparedness

Annually Duquesne Light participates in PJM's Summer Emergency Procedures Drill which is conducted to assess the readiness of system operations personnel during emergency conditions. The objectives of the drills are to ensure that the following occurs:

- i. PJM personnel and member companies understand emergency procedures;
- ii. Communication facilities are adequate between PJM and member companies;
- iii. PJM and member company personnel demonstrated effectiveness of corporate/governmental affairs communications; and
- iv. PJM, as a Regional Transmission Operator (RTO), as well as Local Control Centers (LCCs), and Marketing Operations Centers (MOCs) provide adequate information to governmental agencies.

c. Event Preparedness

Duquesne Light utilizes a comprehensively written Emergency Operations Storm Plan (Storm Plan), which is updated at least annually. The purpose of the Storm Plan is to provide guidelines and procedures for managing the Company's response to service interruption events that result from any cause. Typically, Storm Plan use is required when weather events escalate the Service Interruption Classification to Yellow or Red as defined in the Storm Plan. However, the Storm Plan is also used to address Service Interruption Events caused by events other than weather.

The Storm Plan is designed to provide immediate response and subsequent recovery from any disaster.

The Storm Plan has been developed to:

- Provide an organized and consolidated approach to managing response and recovery activities following an unplanned incident or event;
- Ensure communications with employees, customers, media, regulatory agencies, as well as federal, state and local governments to operate effectively and exchange accurate and timely information.

Duquesne Light also maintains a subscription to AccuWeather, a premier weather forecasting service that provides customized forecasts twice a day, severe weather alerts, and 24/7 availability to an AccuWeather forecaster.

d. Training

Duquesne Light conducts Storm Preparedness Training each year for employees serving roles on the Storm Restoration Team. Duquesne Light's most recent Storm Training was conducted on Thursday, April 27, 2017. During this exercise, a mock summer storm causing wide spread damage to our system was simulated. The Storm Restoration Team was activated and members practiced their roles in working together to safely lead a successful large scale restoration effort. The storm drill was attended by the City of Pittsburgh Emergency Management and a Homeland Security Specialist who shared information on tools such as Knowledge Center, which allows for the transfer of timely and accurate information. The next scheduled training will be conducted on Friday, July 20, 2018.

e. Personnel Sufficient (any plans to hire in the next 6 months)

As of May 21, 2018, Duquesne Light is recruiting internal and external candidates to fill 70 open positions, which does not include 21 Apprentice Lineworker positions that could be filled in August by students that are currently in our Electrical Distribution Technology program. Current openings can be viewed at this link: [Duquesne Light Career Opportunities](#)

The DLC Talent Acquisition strategy is focused on providing hiring managers with a pool of highly-qualified candidates to consider when filling vacancies. In addition to recruiting experienced candidates, DLC has implemented a formal Summer Internship program targeting rising juniors and seniors. The internship program provides the interns with professional work experience and an understanding of the company culture while enabling DLC to gauge the student's aptitude and growth potential as future employees. Between 2016 and 2018, the organization has extended 22 Full-time job offers to former interns.

EDT Program Description: The Electrical Distribution Technology (EDT) program is a joint partnership between Community College of Allegheny County (CCAC) and Duquesne Light to provide training in the basic skills, knowledge, and abilities applicants would need to apply for skilled craft positions in the electric utility industry. The program design, including pre-qualification testing and course content, is intended to not only produce candidates who possess the skills to safely and confidently perform the manual tasks associated with electrical utility work, but also build the foundational skills that will allow them to advance further in their careers.

The EDT program consists of a fast paced and challenging curriculum that incorporates practical application of safety concepts and established work practices in the Overhead, Underground, and Substation Maintenance crafts with college level academic courses in computers, math and electrical theory. Students will attend classes Monday thru Friday, both day and evening, to complete the one year 44 credit course; receiving a Certificate in Electrical Distribution Technology. Students will be responsible for paying their own tuition for the classes at CCAC. There will be two paid internships at the end of each semester as part of the program. Upon graduation, students who excelled during the program and demonstrated the right skills and attitudes will be considered for employment with Duquesne Light through its standard hiring practices.

f. Any Other Relevant Continual Improvement Activity

Duquesne Light is a participant in the Spare Transformer Equipment Program (STEP) program managed by Edison Electric Institute (EEI). The program is a binding obligation to share transformers in the event of a

triggered event as defined by Homeland Security. The binding obligation is an agreement to sell an obligated number of Duquesne Light's spare company in need once a triggering event occurs. The program shares the burden of maintaining spare transformers proportionally across all participants.

To help restore electric service to communities after catastrophic emergencies or significant natural events, 28 utilities – including Duquesne Light Company – have now committed to participate in the Regional Equipment Sharing for Transmission Outage Restoration or RESTORE program, which establishes a proactive approach to providing critical equipment for utilities that need additional resources during disaster recovery. Formed in 2017, RESTORE is designed to enhance the resilience and reliability of the power grid and provide additional sources for utilities seeking critical equipment during disaster recovery and does not replace existing programs or agreements already in place. Duquesne Light Company's participation in the RESTORE program was approved by the Commission on March 15, 2018.

F. Storm Response

a. Outage Restoration Strategy

When the extent of storm damage to the electrical system is severe and widespread throughout the Duquesne Light service area, restoration activities must be prioritized. In all situations, the safety of the public, as well as those working to restore service, is always the overriding and highest priority. Duquesne Light follows these restoration priorities, which are generally universal throughout the electrical utility industry.

i. Public Safety Hazards:

The Company's first priority is to quickly address public safety hazards, such as wires that are down across major highways, burning wires, or equipment or building fires. While downed power lines are being handled, company personnel continue to assess the total damage to the electrical system's infrastructure and begin restoring service.

ii. Public Health and Safety Facilities (Critical Customers):

Repair work that restores power to essential facilities that provide emergency services is a high priority. This includes hospitals, police, fire and emergency facilities, water and sanitary authorities, nursing homes and assisted living facilities, etc.

iii. **Major Circuits:**

Duquesne Light continues rebuilding its system by next focusing on major circuits as it strives to restore power to the greatest number of customers as quickly as possible.

iv. **Small Neighborhoods/Individual Homes:**

Once major circuits have been repaired, restoration efforts focus on smaller neighborhoods and groups of customers served by a single transformer. Finally, service to individual homes and businesses are restored as crews repair "service drops," which are the wires that bring electricity from the nearest pole to an individual building.

b. Communication and Outreach

During major outages and storms, Duquesne Light utilizes a variety of methods to keep customers informed of outages and restoration efforts. These communication methods include regular updates to local media outlets, postings on the company's Twitter, Facebook, and corporate web page, text messages to customers, and updates to the local Emergency Management Agencies.

In addition to providing storm updates, Duquesne Light also uses its social media channels to share electrical safety messages, preparedness messages in advance of storms as well as to discuss Duquesne Light's community involvement. The Company plans to continue leveraging its use of social media to engage with its customers.

Duquesne Light also provides an outage map which is utilized as part of the company's Power Restoration Update Center (PRUC) website. The PRUC is activated when the company experiences a severe storm event.

Duquesne Light has established a process for communicating storm damage and restoration status information to elected officials. Duquesne Light's Storm Manager and Communications Officer will decide when to activate the Government and Regulatory Affairs role, which would then trigger a conference call with federal, state and local elected officials, including state regulators.

c. Outage Restoration and Storm Response Best Practices Implemented and/or Identified for Future Implementation

Duquesne Light's Best Practices Implemented:

- i. The Company has designed its 23kV radial distribution system with normally open tie points to other circuits allowing for switching to restore customers faster during a storm;
- ii. Installation of the Intelliruptor which provides pulse reclosing and limits the amount of customers experiencing an interruption as the circuit attempts to isolate a fault condition;
- iii. The T&D system is also continually monitored to identify poor performing circuits. After a circuit has been identified a maintenance plan is put in place to increase the circuit's reliability;
- iv. A Vegetation Management Plan is in effect to reduce the outages caused by trees during a reasonably expected storm event;
- v. The Company has a Storm Plan in place that defines restoration sequences and priorities. The Company also conducts training on its Storm Plan annually.
 - Duquesne Light adopted the principles of the National Incident Management System (NIMS) and its Incident Command System when managing widespread service outages.
 - The Company also increased its pool and use of supplemental trouble investigators and public protectors fostering an acceleration in identifying and protecting downed wires during a storm.

The Company belongs to two regional mutual assistance groups that are committed to providing restoration resources after a storm at no profit.

Duquesne Light's Best Practices Identified for Future Implementation:

- The Company is committed to the installation of an Outage Management System (OMS), which will provide customers with more accurate restoration information and give the Company the ability to more efficiently restore power during storm events.

d. Any Other Relevant Continual Improvement Activity

Duquesne Light continues to provide Company representative staffing at the Allegheny and Beaver County EMS 911 Center, when requested, for utility representation during major events.

The Company is an active member in the CIIWG (Critical Infrastructure Interdependency Working Group) whose mission is to improve lines of communication between critical infrastructure partners and to encourage cooperation amongst members in order to better prepare for, and respond to, issues involving lifeline functions that support critical infrastructure sectors, and for the gathering of data, best practices and other information in order to produce deliverables that achieve improved communication and cooperation and increase resiliency.