



UGI Utilities, Inc. – Electric Division
Electric Reliability Outlook & Summer Readiness for 2019

Summary

UGI Utilities, Inc. (UGI or Company) continues to review and implement programs aimed at improving our summer readiness with respect to providing safe and reliable service during peak summer loading conditions and to minimize customer outages and restoration times during the summer storm season. The programs that UGI currently has in place and the programs and initiatives currently under review are discussed below.

A. Reliability Enhancement Programs

a. Enhanced Vegetation Management

To bolster UGI's existing Danger Tree Mitigation Program, UGI added an additional vegetation clearance crew in 2018 to address the vegetation issue caused by the Emerald Ash Borers devastation of Pennsylvania's ash trees. The Danger Tree Mitigation Program identifies and addresses trees that pose an elevated threat to transmission and distribution facilities. These new resources will assist with the targeted removal of ash trees both on and off right-of-way. In calendar year 2018, UGI removed 888 Ash trees, and an additional 551 have been removed year to date in 2019. In addition, UGI continues the practice of "ground to sky" trimming on multi-phase circuits and on single phase lines where appropriate.

b. Storm Hardening

UGI's initiatives relative to storm hardening are designed primarily to reduce the number of outage events caused by vegetation. Outside of its Vegetation Management Program, several initiatives are ongoing to mitigate such risks.

UGI has continued its practice of using Class 3 Wood Poles when replacing or installing new poles on its distribution system. On its transmission system, steel, Class 1 or Class 2 poles are standard for replacement or new structures.

In line with the Company's Long-Term Infrastructure Improvement Plan ("LTIIIP"), UGI continues to complete a variety of reliability-based projects. This includes a Primary Line Relocations Program focused on moving distribution lines from troublesome off-road locations to road-side rights-of-way. Relocating the lines to roadside enables quicker patrolling as well as making repairs quicker and safer because mechanized aerial equipment can be used as opposed to climbing the poles to do repair work. Two (2) projects were completed in Fiscal 2018 and one (1) project is in progress and will be



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completed in Fiscal 2019. UGI will continue to identify and relocate additional line sections going forward.

UGI continues its Porcelain Cutout and Insulator Replacement Program where a targeted number of replacements are completed each fiscal year. Although being a long time standard within the utility industry, porcelain is more likely to crack/fail during extreme cold periods due to its susceptibility to moisture. Polymer type cutouts and insulators are less susceptible to moisture and subsequent failure improving overall system reliability.

c. Fuses/Recloser/Automatic Switches

In Fiscal 2018, UGI completed its initial survey of every distribution feeder as part of its Line Segmentation Program. This program focuses on identifying locations to install fuses, disconnects, and other devices to limit the number of customers affected when line damage occurs and enable field personnel to restore service to customers on unaffected line segments through switching before repairs are made. The next phase of this program will add additional feeder segmentation, targeting specific areas which have been prioritized based on current reliability performance. In Fiscal 2019, UGI expects to add twenty (20) fuse installations and replace two (2) fuse installations with air-breaks.

d. Smart Grid

UGI initiated a Distribution Automation Pilot Project in 2015 and based on its success, a five (5) year project plan was developed to extend remote monitoring and control via wireless communication links to 3-phase reclosers on select feeders through-out the system. To date, forty-five (45) reclosers have been installed with, or upgraded to have, communications and another eleven (11) are planned to be completed by the end of Fiscal 2019. Remote management of these devices, by UGI System Operators, will significantly reduce switching times to sectionalize and/or restore customers impacted by outages.

e. Conservation Voltage Reduction (CVR) activity

UGI does not currently engage in Conservation Voltage Reduction activity. However, UGI has initiated a Voltage Control Program to install smart controllers and communications at select capacitor and regulator installations to allow for voltage control from its control center. In addition, this program will provide alarm capabilities and historization of analog quantities to provide data for planning studies.

f. Any Other Relevant Continual Improvement Activity

UGI's LTIP, which was approved by the Pennsylvania Public Utility Commission (PUC) in December of 2017, identified several key areas of investment aimed at replacing aging infrastructure and improving reliability including, Wood Pole



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Replacements, Sectionalizing/Distribution Automation, Underground Cable Replacement, and Substation Equipment Replacement:

- o Year-to-date for Fiscal 2019, UGI has replaced over 110 distribution poles identified through its pole inspection program.
- o Year-to-date for Fiscal 2019, UGI has sixteen (16) projects either completed or in construction to replace identified Underground Cable.
- o For Fiscal 2019 UGI has eighteen (18) new 3-phase reclosers and twenty-one (21) sectionalizing points scheduled for installation.
- o For Fiscal 2019 UGI has one (1) 66/13.8kV transformer, three (3) 13.8kV circuit breakers and three (3) 13.8kV relay packages scheduled for replacement.

UGI has initiated a 66kV air-break motorization program. This program is designed to motorize key 66kV air-breaks providing control from UGI's Control Center. One (1) project has been engineered and is scheduled to be completed in Fiscal 2019. Another project has been identified for Fiscal 2020. UGI will continue to study and identify devices going forward.

UGI has initiated a Distribution Supervisory Control and Data Acquisition (DSCADA) program. In Fiscal 2019, UGI installed a new DSCADA that will leverage its growing number of Distribution Automation devices and substation data concentrators. The benefit of this program is to provide greater visibility to the status of the distribution system and provide control from UGI's Control Center.

B. Preventative Maintenance Programs

In addition to fulfilling its Biennial Inspection, Maintenance, Repair, and Replacement Plan as filed with the Commission, UGI Electric Division continues the following programs geared toward enhancing the reliability of service it provides its customers.

a. Capacitor Inspections

UGI performs an annual inspection of all capacitors on its distribution system. The inspections include a visual inspection to identify blown fuses and general condition, operation of switched capacitor controls and recording voltage checks.

b. Vegetation Management

UGI performs a vegetation management inspection on all its primary overhead distribution facilities every two years. Approximately half the circuit mileage will be inspected each year. The purpose of the vegetation management inspection is to assess



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the condition of vegetation on and off the lines' right-of-way to identify situations that may pose a threat to reliability of service or damage the overhead distribution facilities. In addition, UGI has established expected vegetation line treatment cycle times for its distribution circuits. The vegetation line treatment involves pruning or removal of trees on its system and to chemically treat areas on its distribution lines and right-of-way.

c. Substation Inspections

All UGI substations are visually inspected at least monthly. These inspections include both a physical security and general equipment review. Intrusive inspections and/or diagnostic tests are made on all substation equipment on a periodic basis with corrective maintenance or replacement performed to address identified deficiencies. On a semi-annual basis (summer & winter) all substations undergo an infrared inspection to identify any thermal anomalies associated with connections, fuses, control cabinets, etc.

d. Aerial Patrols

UGI completes an annual aerial Light Detection and Ranging (LIDAR) assessment of our 230kV transmission facilities to identify any potential vegetation or encroachment concerns. The last inspection was completed in June 2018 and no issues were identified. The annual LIDAR assessment is scheduled for June 2019.

An aerial patrol of the UGI 230kV transmission system was completed in May 2018. During the patrol a visual inspection is performed with respect to wire, insulators, structures etc. and areas of concern are photographed and reported for follow-up work. All issues identified during the 2018 patrol were addressed based on their criticality. The next aerial inspection will be completed in 2020.

e. Infrared Inspections

As stated above, UGI completes a semi-annual (summer & winter) infrared inspection of its substation equipment.

f. Any other relevant continual improvement activity

Overhead line devices (3-phase and single phase), which includes, sectionalizers, and voltage regulators and their controls are removed from service and maintained on a fixed periodic basis.

Automatic splice connections on the distribution system are being visually inspected and their location documented for future reference. Any critical issues identified during the inspection are corrected immediately.



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An intrusive inspection is made on all underground line terminal equipment and a neutral integrity test is performed on all line segments on a fixed periodic basis. Corrective maintenance or replacement is performed on deficiencies identified during these inspections.

C. Capacity Planning

Based on the forecasted summer peak load, UGI does not expect any significant issues with respect to capacity from a transmission or distribution perspective. UGI performs annual planning studies and reviews transmission, substation and feeder loading under various contingencies for compliance with UGI planning and reliability criteria. Delivery system capacity expansion plans are made based on these study results. The UGI 2018 summer peak was 205 MW's which is 4.2% less than the all-time summer peak of 214 MW's. The 2019 summer peak is expected to increase slightly over 2018 due in large part to a significant increase in commercial development/load within UGI's Hanover Industrial Park (HIP). To address this localized increase and to plan for proposed future development in the surrounding area, UGI has begun construction of a new two-transformer 66/13.8 kV 25MVA substation with eight (8) distribution feeders and fed by dual 66kV transmission lines. The proposed in-service date for the new substation and four (4) distribution feeders is September 2019. In addition, to increase reliability, UGI completed a new express distribution feeder in its' Hanover Industrial Park (HIP) in 2019 to add tie-line support for reliability and to provide load support.

On the distribution side, the Huntsville Substation expansion project was completed in late summer 2017. This project added a second 66/13.8kV, 25MVA transformer and three (3) additional feeder circuits. These lines are used to shift load onto the new transformer thereby reducing load on existing substations/transformers. The additional capacity and feeders will also improve reliability by providing new, full capacity tie-lines to adjoining substations which will be used to restore customers impacted by outages. Similarly, the Swoyersville #1 transformer was replaced in 2018 increasing capacity from 16MVA to 26MVA and the Swoyersville #2 transformer is scheduled for 2019. Capacity enhancements were completed in 2018 on feeders serving the Dallas, Huntsville and Hanover load centers. In addition, work continues on the multi-year Hunlock-Koonsville tie-line project designed to extend a high capacity three-phase circuit into a rural portion of UGI's service territory to provide additional capacity and restoration options. Finally, UGI has an ongoing line rebuild and voltage conversion program to rebuild vintage 8 kV and 4 kV distribution lines and convert them to operate at 13 kV.



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D. 2018/2019 Storm Update and Lessons Learned

Due to unfavorable weather conditions, UGI had one (1) reportable event in 2018 and one (1) reportable event in early 2019. UGI continues to look for areas to improve restoration planning and overall emergency response procedures. The UGI Restoration Team meets bi-weekly to focus on training, best practices and technology enhancements. Following UGI's latest major storm event in April 2019, UGI conducted a post storm review to identify areas for improvement and to communicate lessons learned to the entire restoration team. The review produced several recommendations. With respect to the recommendations, implementation status is as follows:

- A need for additional damage assessment and support personnel (Complete) – UGI contracted with Osmose Utility Services Inc. to provide additional storm restoration services such as damage assessment and wire watching. In addition, UGI has contracted with Traffic Plan to provide additional flagging resources. Finally, UGI is also exploring the use of UGI Gas personnel to provide logistical and assessment support during storm restoration events (in progress).
- UGI is in the process of better defining specific storm roles and associated training which will allow for a more efficient utilization and mobilization of storm restoration resources. To date, UGI has defined nearly all storm roles, based on its modified Incident Command System (ICS), and is assigning personnel to fill those roles.
- A need for more frequent updates from field personnel relative to device status (Complete) – Enhancements to the Partner mapping system are on a continual basis from user recommendations. In addition, based on its modified ICS, UGI has identified a role to communicate with field resources to update device status.
- UGI continues to work with its field personnel to establish a process for defining estimated time of restoration (ETR) and communicate this information to its control center.
- UGI is working with our local 911 Agency to improve communications relative to providing crew ETA's in response to "blue-sky" type emergencies such as structure fires and downed or low wires.

Other areas of focus include:

- In early 2019, UGI tested and will soon adopt, SEND WORD NOW notifications to mass contact employees during a major storm event. The system will place a phone call and send a text alerting the employees of system trouble and requesting a response that the message was received.
- UGI is currently working on enhancements to its internal facing Outage Map. Enhancements include outage specific data including ETR's and crew status as well as a



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more detailed and focused outage location map. In addition, UGI is investigating the feasibility of creating an application that can be installed on a Smartphone, allowing field personnel to input damage assessment and ETR's for specific events.

- UGI also reviewed its informational booklet for mutual assistance crews for updates. Titled “Electric Operations Manual for Mutual Assistance Workers”, the booklet provided crews with information related to:
 - Safety
 - PPE Requirements
 - Emergency Medical Locations
 - System Parameters (Voltages/Wire Sizes)
 - Lock-out/Tag-Out Procedure
 - Restoration Practices
 - Communications

UGI will continue to review and update this booklet as necessary to provide beneficial information to incoming mutual assistance crews.

- In 2019, UGI created a “Storm Standards Book” as a companion resource to its mutual assistance information booklet for use by mutual assistance crews when providing storm restoration service. This book is designed to assist mutual assistance crews when repairing facilities to ensure repairs are consistent with UGI Standard Construction.

E. 2019 Summer Readiness

a. Capacity Additions

As mentioned above in the Capacity Planning section, UGI has several projects either completed or in various stages of completion that will increase the capacity of its distribution lines and provide more options to restore service to customers during storm restoration events.

b. Transmission Preparedness

UGI performed the annual planning review of the transmission system utilizing current and forecast load flow models to identify any voltage or thermal criteria violations. Results of the analysis did not indicate any issues under the various contingency scenarios.

c. Event Preparedness

UGI continues to improve its event preparedness through its Storm Restoration Team meetings and focusing drills on various aspects of storm restoration such as, pre-



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planning, on-boarding, communications etc. Adopting a modified incident command structure, to better align with UGI Electric Division personnel abilities, allows for better execution of its restoration plan. In addition, UGI continues to be an active member of the EDC Storm Best Practices Group and the North Atlantic Mutual Assistance Group.

d. Training

UGI is undergoing a re-evaluation of its training program to better align its modified incident command structure with storm roles and personnel. In addition, UGI is presently installing a replacement Learning Management System (LMS) to track personnel qualifications to insure employees are receiving the proper training for roles they are assigned.

e. Personnel Sufficient

UGI added additional contractor line construction resources in 2019 and filled all of the open substation electrician positions which will provide adequate staffing to address any typical summer event. For large scale storm events, UGI looks to supplement in-house resources with mutual aid.

F. 2019 Storm Response

a. Personnel Sufficient

UGI's outage restoration strategy is like that of other electric utilities in the state. Its priority is to address public safety situations, such as live wires down, structure fires or other similar hazards. While addressing public safety situations, UGI concentrates transmission resources to restore power to its substations and then focuses on restoring service to feeders that serve critical infrastructure, such as water, sewer, and emergency services facilities. It then works on restoring its remaining distribution lines starting from the substations and working outward locally prioritizing the repair jobs based upon the number of customers that can be restored, the location of its resources, and the magnitude of the repair jobs so that it generally restores service to the most customers in the shortest period of time. Restoring service to critical needs customers is factored into its restoration process.

b. Communication and Outreach

The UGI Communications and Community Relations Department and the UGI Outreach Program use an integrated platform of channels to provide critical information to customers. Additional communications are provided to customers and community



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residents during extreme weather events, emergency situations and service outages. The communication channels and tools UGI utilizes include:

- Media communications, such as:
 - Public Service Announcements
 - Media advisories
 - News releases
 - On-air interviews and appearances
- UGI website postings, such as:
 - Banners on UGI.com homepage
 - Activation of Outage Center ‘tile’ on the UGI.com website
 - Live/updated information on Outage Center Map
- Social media information and update postings, such as:
 - Facebook
 - Twitter
 - UGI Connection (blog)
 - Linked-In
 - Instagram
- Outbound email to UGI Electric Division customers

All content provided to customers and interested parties is consistent across the traditional, broadcast, digital and social media channels. In addition, electronic links are provided on social media posts to make the underlying information documents easily assessable to customers and interested parties. UGI also maintains response protocols for inquiries from customers that are posted on social media sites. First, customers who may have an emergency are directed to contact UGI’s Call Center. In addition, any customer social media posts on service-related matters are treated by UGI as ‘escalated’ inquiries and the customer is asked to send a private communication (email or call) so that specific customer information can be collected, and an appropriate response provided by Company representatives.

UGI maintains traditional direct-to-customer communication channels. These include information provided via continuously-updated Call Center messages on the Company’s phone system, scripts prepared for use by Call Center representatives when interacting with customers, and messages prepared for use with the Company’s ‘predictive dialer’ capability.

Additionally, UGI provides regular updates, information and links to additional resources on key topics to customers via bill messaging, bill inserts, printed notices and a monthly customer newsletter called “Plugged-In” included with both printed and electronic bills.



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UGI also conducts an extensive municipal outreach program aimed at reinforcing relationships with, and providing information to, elected and appointed municipal leaders, public safety professionals and emergency response officials. Outreach meetings with elected and appointed officials are conducted throughout the year. Topics include coordination of incident response efforts, safety, planned construction projects, and other matters of mutual concern.

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

UGI uses a restore before repair approach, such that customers that can accept service are restored through switching and fuse replacement before engaging the field crews in repair work. This method of operation applies throughout the restoration effort such that as line segments become available to return to service after repairs are made, they are placed in service to restore service to customers on them.

Through its Storm Restoration Team meetings UGI has adopted a practice where outage restoration strategy is determined by a combination of outage events and customers affected. UGI uses a centrally controlled operation during minor event restorations. Scouts, line clearance, and line construction crews are dispatched from the control center to verify device status, perform switching, assess OMS events, and begin restoration. For smaller events, this strategy maximizes personnel efficiency and provides a central command center to oversee restoration. For major events, UGI uses a decentralized mode of operation. Depending upon the extent of the damage to its system, UGI divides its service territory into areas and assigns an area coordinator to manage damage repairs in each area. Each area coordinator has complete responsibility to plan and manage the resources to restore service in his/her assigned area. UGI has found this strategy eliminates communications bottlenecks such that available resources are used most effectively.

G. Average Service Availability Index (ASAI) for the 5% Worst Performing Circuits (Period starting Jan 1, 2019 and ending Mar 31, 2019) and Customer Minutes of Interruption (CMI)

UGI's worst performing circuit has an Average Service Availability Index of 0.99950 and a Customer Minutes of Interruption of 456.