



UGI Utilities, Inc. – Electric Division  
Electric Reliability Outlook & Summer Readiness for 2018

Summary

UGI Utilities, Inc. (UGI) 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.

Reliability Enhancement Programs

In addition to fulfilling its Biennial Inspection, Maintenance, Repair, and Replacement Plan as filed with the Commission that became effective on January 1, 2017, UGI Electric Division has the following ongoing programs geared toward enhancing the reliability of service it provides its customers:

- UGI initiated a Distribution Automation Pilot Project in 2015 and based on its success, a five (5) year project plan was been developed to extend remote monitoring and control via wireless communication links to 3-phase reclosers on select feeders through-out the system. To date, communication to twenty-seven (27) existing devices has been completed and another three (3) are planned to be completed by end of Fiscal 2018. Additionally, twenty-two (22) new 3-phase reclosers with communication are planned to be installed by end of Fiscal 2018. Remote management of these devices, by UGI System Operators, will significantly reduce switching times to sectionalize and/or restore customers impacted by outages.
- To bolster UGI's existing Danger Tree Mitigation Program, UGI added additional vegetation clearance resources 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 mainly off right-of-way trees that pose a threat to transmission and distribution facilities. These new resources will specifically target the removal of ash trees both on and off right-of-way. In addition, UGI continues the practice of "ground to sky" trimming on multi-phase circuits and on single phase lines where appropriate.
- A Line Segmentation Program focuses on identifying locations to install fuses, disconnects, and other devices to limit the number 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. To date UGI has completed patrols of 88% of our overhead distribution feeders identifying over 206 locations for new devices with installation completed at 146 or 71% of these locations. In 2018 UGI will complete patrols of an additional four (4) distribution circuits and plans to install sixteen (16) new sectionalizing devices.
- A Primary Line Relocations Program to move distribution lines from troublesome off-road locations to road side rights-of-way. Relocating the lines to road side enable 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. Four (4) projects were completed in Fiscal 2017 and three (3) year-to-date in Fiscal 18. UGI will continue to identify and relocate additional line sections going forward.
- UGI's Long Term Infrastructure Improvement Plan (LTIIP) was approved by the Pennsylvania Public Utility Commission (PUC) in December of 2017. UGI identified four key areas of investment: Pole replacement, Sectionalizing/Distribution Automation, Underground Cable Replacement, and Substation Equipment.
  - Year-to-date for Fiscal 2018 UGI has replaced over 100 distribution poles identified through its pole inspection program.
  - Year-to-date for Fiscal 2018 UGI has sixteen (16) projects either completed or in construction to replace identified Underground Cable.
  - For Fiscal 2018 UGI has twenty-two (22) new 3-phase reclosers and sixteen (16) sectionalizing points scheduled for installation.
  - For Fiscal 2018 UGI has one (1) 66/13.8kV transformer, three (3) 13.8kV circuit breakers and three (3) 13.8kV relay packages scheduled for replacement.



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#### Preventive Maintenance Programs

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

- All 170 capacitors on the UGI system are checked biannually. This includes a visual inspection, operation of switched capacitor controls and recording voltage checks.
- All overhead line devices (3-phase and single phase), which includes reclosers, sectionalizers, and voltage regulators and their controls are removed from service and maintained on a fixed periodic basis.
- 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.
- 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.
- 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.
- UGI completes an annual aerial LIDAR assessment of our 230kV transmission facilities to identify any potential vegetation or encroachment concerns. The last inspection was completed in July 2017 and no issues were identified.
- 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.
- All UGI substations are visually inspected at least monthly. These inspections include both a physical security and general equipment review. 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.

#### 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 2017 summer peak was 178 MW's which is 16.8% less than the all-time summer peak of 214 MW's. The 2018 summer peak is expected to increase slightly over 2017 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 initiated a project to construct a new two-transformer 66/13.8 kV 25MVA substation with eight (8) distribution feeders. The proposed in-service date for the new substation and four (4) distribution feeders is September 2019. In addition, to increase reliability, UGI is currently constructing a new express distribution feeder in its' Hanover Industrial Park (HIP) to add tie-line support for reliability and to provide load support. UGI continues to work on existing transmission and distribution projects. From a Planning perspective, due to proposed increased load in the Hanover Industrial Estates, UGI analysis has identified potential significant feeder and transformer loading issues due to a N-1 contingency.

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



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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. Target areas for the tie-lines include some of the worst performing circuits. Capacity enhancements were completed in 2017 on feeders serving the Dallas and Swoyersville load centers. In addition, the Hunlock-Koonsville tie-line project was 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. This is a multi-year project which is scheduled to be completed in 2021. 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.

Storm Updates/Lessons Learned

Due to favorable weather conditions, UGI had no reportable events in 2017. 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 last major storm event in July 2014, 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. UGI is also exploring the use of UGI Gas personnel to provide logistical support during storm restoration events.
- 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.
- Investigate other weather service providers (Complete) – UGI contracted with a new weather service StormGeo in 2017, which offers expanded storm prediction models, enhanced dashboards and more in-depth weather reports.
- 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. Refresher training on the device status functionality within Partner are held quarterly.
- Establish First Responder Training Programs (Complete) – UGI in partnership with RTUE developed an on-line and in-person First Responder Training Program for Electrical and Natural Gas Emergencies. The program provides important safety information for first responders related to down-wires, step potential, utility interaction as well as an introduction to electricity and fundamentals of the electric transmission and distribution system. UGI employees also conducted two (2) in-person first responder safety training sessions with the largest metropolitan fire department in the service territory in March 2017.
- 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 2017, UGI implemented the ARCOS call-out system to provide automated callout of employee resources. The automated system replaced UGI's manual callout process, thereby improving efficiency and overall crew response time. The system can also be utilized to mass-contact UGI employees during an "all hands-on-deck" situation like a major storm event.
- UGI is currently working on enhancements to its public facing Outage Map and functionality supporting customer outage reporting. The upgrades which are scheduled to be completed by mid-summer 2019, will enable customers to submit outages via mobile devices and provide more dynamic



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- outage information via the UGI Outage Map. Map enhancements include outage specific data including ETR's and crew status as well as a more detailed and focused outage location map.
- 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.

### 2018 Summer Readiness

As mentioned above in the Capacity Planning section, UGI has a number of 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.

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.

UGI is planning to conduct its 2018 Spring Restoration Drill in June 2018. The drill will focus on pre-storm readiness, dispatch/field communications, and use of the Partner damage assessment tool. UGI's Outage Management System (OMS) will be utilized during the drill, populated with customer calls reflecting a typical summer storm. Personnel from UGI's Electric Operations Department will participate in the drill. The drill will provide UGI the opportunity to evaluate and update its current restoration and communications plans. The goal is to reduce unnecessary calls to dispatchers using Partner map updates, automatically delivered to dispatchers via the map and a corresponding spreadsheet. UGI also continues to be an active member of the EDC Best Practices Operations Team and the North Atlantic Mutual Assistance Group.

### Outage Restoration Strategy

UGI's outage restoration strategy is similar to that of other electric utilities in the state. It first restores 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. Public safety situations get immediate attention regardless of where UGI is in its restoration process.

UGI uses a restore before repair approach, such that customers that can have their service restored through switching and fuse replacement are restored 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.



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UGI uses System Operator controlled operation during minor event restorations. Scouts, line clearance, and line construction crews are dispatched from System Operations 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.

UGI uses a decentralized mode of operation during major event restoration effort. Depending upon the extent of the damage to its delivery 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.

### Communications and Outreach

#### Traditional Customer Communication Channels

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.

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.

#### Broadcast Media, Social Media, Digital Communication Channels and Tools

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 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



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- 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.

Average Service Availability Index (ASAI)

For the last twelve month rolling average, UGI's worst performing feeder has an Average Service Availability Index of 0.99988.