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August 16, 2017

VIA ELECTRONIC FILING

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor North
P.O. Box 3265
Harrisburg, PA 17105-3265

Re: Petition of UGI Utilities Inc. - Electric Division for Approval of its Long-Term Infrastructure Improvement Plan - Docket No. P-2017-

Dear Secretary Chiavetta:

Enclosed for filing is the Petition of UGI Utilities Inc. – Electric Division for Approval of its Long-Term Infrastructure Improvement Plan. Copies will be provided as indicated on the Certificate of Service.

Respectfully submitted,

Jessica R. Rogers

JRR/jl
Enclosures

cc: Certificate of Service

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing has been served upon the following persons, in the manner indicated, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a participant).

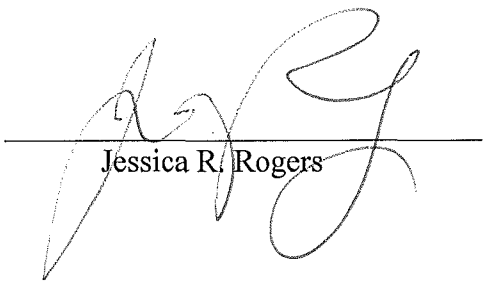
VIA FIRST CLASS MAIL

Office of Consumer Advocate
555 Walnut Street
Forum Place, 5th Floor
Harrisburg, PA 17101-1923

Office of Small Business, Advocate
300 North Second Street, Suite 202
Harrisburg, PA 17101

Bureau of Investigation &, Enforcement
Commonwealth Keystone Building
400 North Street, 2nd Floor West
PO Box 3265
Harrisburg, PA 17105-3265

Date: August 16, 2017



Jessica R. Rogers

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Petition of UGI Utilities Inc. – Electric Division for Approval of its Long-Term Infrastructure Improvement Plan	: : :	Docket No. P-2017-_____

Petition of UGI Utilities Inc. – Electric Division for Approval of its Long-Term Infrastructure Improvement Plan

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Pursuant to 66 Pa.C.S. §1352[1] and the Commission's regulations at 52 Pa. Code §§ 121.1 – 121.8, UGI Utilities Inc. – Electric Division ("UGI-ED" or the "Company") hereby files this Petition seeking approval of its Long-Term Infrastructure Improvement Plan ("LTIIP" or "Plan"). UGI-ED is undertaking a significant distribution system evaluation, repair, improvement and replacement program. As described in its LTIIP, this program is under way, and has accelerated primarily to address the need to replace aging infrastructure on many parts of UGI-ED's system. The Company's LTIIP proposes to continue its accelerated investment as part of the effort to ensure safe and reliable service now and in the future. The process is described below and in further detail in the LTIIP.

By this Petition, the Company respectfully requests that the Commission approve UGI-ED's Long-Term Infrastructure Improvement Plan, which is attached as Exhibit A.

I. INTRODUCTION

1. UGI-ED is a division of UGI Utilities, Inc. ("UGI Utilities"), a corporation organized and existing under the laws of the Commonwealth of Pennsylvania, and a wholly owned subsidiary of UGI Corporation. UGI-ED primarily provides electric distribution services

[1] 66 Pa.C.S. §1352 was added to the Public Utility Code by the provisions of Act 11 of 2012 ("Act 11" or the "Act"), which amended Chapters 3, 13 and 33 of the Pennsylvania Public Utility Code ("Code").

to approximately 62,000 customers in Luzerne and Wyoming counties in Northeastern Pennsylvania. UGI-ED is a "public utility" and an "electric distribution company" ("EDC") as those terms are defined under the Public Utility Code, 66 Pa. C.S. §§ 102 and 2803. UGI-ED's system contains more than 1,200 circuit miles of overhead and underground primary distribution lines, and associated equipment and substations.

2. UGI-ED is affiliated with three Commission-regulated natural gas distribution companies, namely UGI Utilities – Gas Division ("UGI-GD"), and its two wholly-owned subsidiaries UGI Central Penn Gas, Inc. ("UGI-CPG") and UGI Penn Natural Gas, Inc. ("UGI-PNG").

3. The names, addresses and telephone numbers of UGI-ED's attorneys for purposes of this filing are as follows:

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UGI-ED's attorneys are authorized to receive all notices and communications regarding this filing.

4. The provisions of 66 Pa.C.S. §1352 authorize EDCs to submit LTIIPs for Commission review and approval.

5. The provisions of 66 Pa.C.S. §1353 authorize EDCs to petition the Commission to establish a distribution system improvement charge ("DSIC") to recover the reasonable and prudent costs incurred to repair and improve or replace "eligible property". A Commission-approved LTIIP is a precondition to the implementation of a DSIC.

6. Eligible property that may be properly recovered through the DSIC must be included in an LTIIP. For electric distribution companies, eligible property is defined in Section 1351 of the statute. *See* 66 Pa.C.S. § 1351(1).

7. The Commission's regulation at 52 Pa. Code §121.3 requires an LTIIP to include the information shown below, and establishes specific procedures for LTIIP filings:

(1) Identification of types and age of eligible property owned and operated by the utility for which it is seeking DSIC recovery.

(2) An initial schedule for planned repair and replacement of eligible property.

(3) A general description of location of eligible property.

(4) A reasonable estimate of quantity of eligible property to be improved or repaired.

(5) Projected annual expenditures and means to finance the expenditures.

(6) A description of the manner in which infrastructure replacement will be accelerated and how repair, improvement or replacement will ensure and maintain adequate, efficient, safe, reliable and reasonable service to customers.

(7) A workforce management and training program designed to ensure that the utility will have access to a qualified workforce to perform work in a cost-effective, safe and reliable manner.

(8) A description of a utility's outreach and coordination activities with other utilities, Department of Transportation and local governments regarding the planned maintenance/construction projects and roadways that may be impacted by the LTIIP.

8. UGI-ED's LTIIP addresses each of the elements of the applicable statute and Commission regulations.

II. UGI-ED'S LONG-TERM INFRASTRUCTURE IMPROVEMENT PLAN

9. In accordance with the provisions of 52 Pa. Code §121.3, UGI-ED's LTIIP includes only distribution plant that is DSIC eligible. The Company's infrastructure replacement program will allow the Company to continue to provide safe and reliable service into the future. Without the accelerated investment identified in the LTIIP, UGI-ED believes there would be increased risk to system reliability, as well as the prospect of increasing maintenance costs. The LTIIP identifies a plan for UGI-ED to remove aging portions of its system and to enhance the safety of its system by ensuring replacement of facilities with new and safer equipment. The plan also provides for inspection and assessment of facilities, to determine whether repair or replacement is required, which will ensure effective use of funds. As a result of the LTIIP, the public will receive improved service, with decreased risk of service disruption.

A. ELIGIBLE PROPERTY TO BE IMPROVED, REPAIRED, OR REPLACED

10. UGI-ED is including the following types of property as DSIC-eligible distribution infrastructure that will be replaced as part of its plan, consistent with 66 Pa.C.S. § 1351(1):

- Poles and towers;
- Overhead and underground conductors;
- Transformers and substation equipment;
- Insulators, circuit breakers, fuses, reclosers, grounding wires, crossarms and brackets, relays, capacitors, converters and condensers;

- Unreimbursed costs related to highway relocation projects where an electric distribution company must relocate its facilities; and
- Other related capitalized costs.

11. The facilities identified in Paragraph 10 are non-exhaustive. However, all of the facilities included in UGI-ED's LTIIP are considered "eligible property" under Section 1351(1).

12. The age of the UGI-ED facilities being targeted in the LTIIP is very broad, as shown in the charts on pages 3 through 5 of the LTIIP. Much of the core UGI-ED distribution system is over 40 years old. For instance, the average age of UGI-ED wood poles is 40 years old, and UGI-ED has identified more than 14,000 wood poles that are more than 50 years old. For substation distribution transformers, the average age is 41 years old, with 63% of units exceeding 40 years old. In addition, approximately 40 percent of UGI-ED's circuit breakers are 40 years old or more.

13. The facilities being addressed in the LTIIP are found in all parts of the Company's service territory. A map showing UGI-ED's service territory is provided on page 2 of the LTIIP.

B. PROJECTED ANNUAL EXPENDITURES AND MEASURES TO ENSURE THAT THE PLAN IS COST EFFECTIVE

14. UGI-ED has provided a table showing the projected annual expenditures over the Plan's five year period on page 9 of its LTIIP. In addition, the table on page 13 shows the average baseline expenditure for each individual program (2012 to 2015), the actual and anticipated expenditures during the ramp up period (2016 and 2017), the projected expenditures on a yearly basis for each of the individual programs for the five-year plan period, the total projected expenditures for each program at the conclusion of the five-year period, and the overall projected annual and total expenditures for all DSIC eligible distribution property. Individual

program expenditure information is included in the sections describing the individual programs.

15. UGI-ED's projected annual expenditures for the LTIIP is presented on page 9 of its LTIIP. UGI-ED's projected annual investments in distribution infrastructure replacement will be approximately $7.6 million beginning in fiscal year 2018, increasing up to $8.3 million in fiscal year 2022. By 2022, the LTIIP will increase annual infrastructure investment by more than 130% over the baseline period. UGI-ED will invest almost $40 million in infrastructure repair and replacement over the five year life of the LTIIP.

16. UGI-ED's primary focus in its LTIIP is to maintain the highly reliable service its customers currently experience, while addressing the risk to continued reliability associated with its aging infrastructure. UGI-ED has already undertaken an accelerated focus on infrastructure repair and replacement, and has implemented several infrastructure and technology-based reliability programs including accelerated underground cable and wood pole replacement, Distribution Automation, enhanced feeder sectionalizing and primary substation tie-line additions. These programs have been developed to address significant long-term reliability factors. In addition to these programs, the UGI-ED LTIIP adds other infrastructure replacement programs, which the Company fully expects will improve overall system reliability and reduce historical weather-related variability.

17. In addition to the specifically identified plant that will be proactively replaced, UGI-ED also focuses a portion of its LTIIP on unanticipated equipment failures. These equipment failures occur during the normal course of business, have numerous causes that are outside the Company's control, and cannot be predicted. UGI-ED relies on a comprehensive inspection and maintenance program to ensure equipment is properly maintained or replaced and to identify and prioritize maintenance issues or trends which may have an immediate or long-

term system impact. UGI-ED's inspection programs and goals are documented in the biennial PUC Inspection & Maintenance Plan ("PUC I&M") and the Annual PUC Reliability Report. This process ensures effective use of resources and minimizes disruption to the customers and municipalities that UGI-ED serves.

18. The Company will conduct ongoing reviews to ensure that the programs in the LTIIP are effective, and will utilize the information from its ongoing reviews to determine the most cost-effective strategy for replacing its distribution infrastructure on a going forward basis. Specifically, on an annual basis, UGI-ED will review the impact to reliability that LTIIP programs have by measuring and comparing post-plan implementation reliability indices with historical reliability indices on a per feeder basis. Reliability metric performance may result in the redirection of spending to help ensure UGI-ED's ability to meet its identified reliability targets in a cost-effective manner.

19. In addition, UGI-ED's utilization of a competitive bid process, particularly for the contractor workforce as well as material purchases, will assist the Company in maintaining a cost-effective approach to the implementation of LTIIP programs.

C. ACCELERATED REPLACEMENT

20. In its Final Implementation Order, the Commission noted that utilities should reflect and maintain an acceleration of infrastructure replacement.[2] The Commission also noted that some utilities have already taken substantial steps towards increasing capital investment to address the issue of aging infrastructure. For those utilities, the Commission requested that the LTIIP "reflect how the DSIC will maintain or augment acceleration of infrastructure replacement and prudent capital investment." *Final Implementation Order* at 19.

[2] *Implementation of Act 11 of 2012*, Docket No. M-2012-2293611, p. 18 (Pa. Pub. Util. Comm'n Aug. 2, 2012) ("Final Implementation Order").

21. Over the baseline period of 2012 through 2015, UGI-ED invested approximately $3.5 million annually on repairing and replacing its distribution infrastructure. UGI-ED has already accelerated capital investment in infrastructure replacement above this baseline amount. Total DSIC eligible spending, as reflected in the LTIIP, shows that UGI-ED has increased its capital spending to $5.7 million in 2016, and $6.2 million in 2017. The pre-LTIIP acceleration of infrastructure repair and replacement was done to address certain identified areas of aged infrastructure improvements – specifically poles and underground cable.

22. For the five year period reflected in the LTIIP, the Company has committed to a significant increase in capital investments, totaling between $7.6 and $8.3 million per year. This reflects an acceleration in spending of more than 134% over the baseline period. UGI-ED has clearly shown that it has accelerated its infrastructure replacement, consistent with the requirements in 52 Pa. Code § 121.3(a)(6).

23. UGI-ED believes that replacement of aging distribution equipment and facilities will reduce the number of outages customers experience, allow it to install additional safety mechanisms, and will generally improve service to its customers.

D. WORKFORCE MANAGEMENT AND TRAINING PROGRAM

24. The Commission's regulations requires utilities to include a workforce management and training plan as part of their LTIIP. *See* 52 Pa. Code § 121.3(1)(7). A description of UGI-ED's workforce management and training plans are found on pages 10 through 12 of its LTIIP. UGI-ED's workforce is comprised of both employees who work directly for UGI-ED, and workers hired by contractors of UGI-ED. UGI-ED utilizes a wide variety of programs to ensure that it has a qualified workforce.

25. The breakdown of work between contractor and Company crews is necessary to provide enough flexibility to ensure adequate and timely resources are available to address non-

LTIIP related maintenance and capital projects including new business installations. The composition of the workforce is managed to accommodate planned capital projects, routine maintenance activities, anticipated new business growth and typical weather related outages.

26. The UGI-ED line distribution workforce is comprised of ten (10) Journeymen linemen that perform a versatile mix of capital and maintenance projects along with a customer troubleshooting function. UGI-ED also employs five (5) fulltime substation employees supported by in-house engineering and supervision to complete planned substation maintenance and capital improvements.

27. UGI-ED administers a formal training and evaluation process for all of its directly employed qualified electrical workers. UGI-ED is subject to the training requirements set forth in the Occupational Safety and Health Administration ("OSHA") Regulation 29 CFR 1910.269 Electrical Power Generation, Transmission and Distribution in addition to internally developed training programs. UGI-ED only hires fully qualified Journeyman linemen. Employees participate in OSHA 1910.269 refreshers and reviews of applicable safety related work practices and procedures. This, coupled with regular supervisor inspections, ensures employees are qualified and complying with all safety related work practices.

28. A significant portion of LTIIP related programs including pole replacements, Pennsylvania Department of Transportation relocations, and primary tie-line distribution projects have traditionally been handled by UGI-ED's contractor workforce. Currently UGI-ED employs seven (7) contractor crews totaling 28 full time resources. This workforce was increased by seven (7) additional full time resources during the 2016 -2017 time period to support the acceleration in planned capital work. UGI-ED typically renews the contractor resource

agreement through a competitive bid process every three to five years, which helps the Company ensure a safe and cost efficient utilization of the contractor workforce.

29. All contractors must confirm that their employees are OSHA 1910.269 qualified employees, and only those employees may work in restricted areas. UGI-ED reviews contractor safety and training records, safety rules and programs, drug and alcohol policies and OSHA 300 Logs prior to selection. Once on property, UGI-ED requires contract line construction employees to participate in De-Energizing Lines and Equipment training. This training also provides information on UGI-ED facilities, distribution equipment and the standard communication protocols between System Operations and field personnel, particularly during switching operations and system emergencies. UGI-ED also sponsors training on equipotential grounding for all field personnel responsible for installing or overseeing the installation of grounds to de-energize electric conductors.

30. A UGI-ED company supervisor has direct oversight responsibility for all contractor performance including quality, safety, efficiency and billing activities. Further, all personnel, whether company or contractor, have "stop-job" authority if a safety concern is identified, which triggers an investigation by UGI-ED operations and safety personnel, who will address the situation as necessary. Finally, UGI-ED maintains a dedicated electric safety resource. This employee oversees the advancement of electric specific safety policies and procedures.

III. EVIDENTIARY HEARINGS

31. Neither applicable statutory provisions nor the Commission's regulation at 52 Pa. Code §121.4(c) require hearings on LTIIPs. However, if UGI-ED's LTIIP is set for hearings, the Company will file, in advance of the prehearing conference, written direct testimony to more fully explain how the Plan was developed, and how it meets the requirements outlined in the

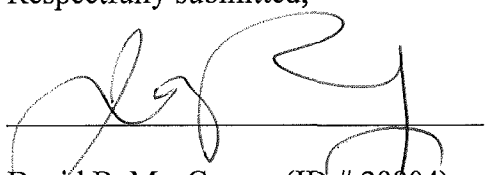
Commission's regulations.

32. Pursuant to the provisions of 52 Pa. Code §121.4(a), UGI-ED is serving its LTIIP on the statutory advocates.

IV. CONCLUSION

WHEREFORE, UGI Utilities Inc. – Electric Division respectfully requests that the Pennsylvania Public Utility Commission find that its Long-Term Infrastructure Improvement Plan contains all necessary items identified in 66 Pa. C.S. § 1352 and 52 Pa. Code §§ 121.1 – 121.8, addresses only distribution property which is DSIC-eligible, as defined by 66 Pa. C.S. § 1351(1), and that the Pennsylvania Public Utility Commission approve the Company's Long-Term Infrastructure Improvement Plan.

Respectfully submitted,



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Of Counsel:

Post & Schell, P.C.

Attorneys for UGI Utilities Inc. – Electric Division

Date: August 16, 2017

APPENDIX A

UGI Utilities Inc. - Electric Division

Long Term Infrastructure Improvement Plan

2018 to 2022

Introduction

This document is being submitted by UGI Utilities Inc. - Electric Division (UGI-ED) pursuant to the requirements of Section 1352 of the Pennsylvania Public Utility Code, 66 Pa.C.S. § 1352, the Commission's implementing regulations at 52 Pa. Code §§ 121.1 – 121.8, and the Pennsylvania Public Utility Commission's (PUC or Commission) Final Implementation Order *for Implementation of Act 11 of 2012*, at Docket No. M-2012-2293611 (Order entered on August 2, 2012). This document describes UGI-ED's existing and proposed betterment initiatives, and is respectfully submitted for approval as the Company's Long-Term Infrastructure Improvement Plan (LTIIP).

The UGI-ED LTIIP is structured to address the following specific components of an LTIIP as set forth at 52 Pa. Code §121.3(a):

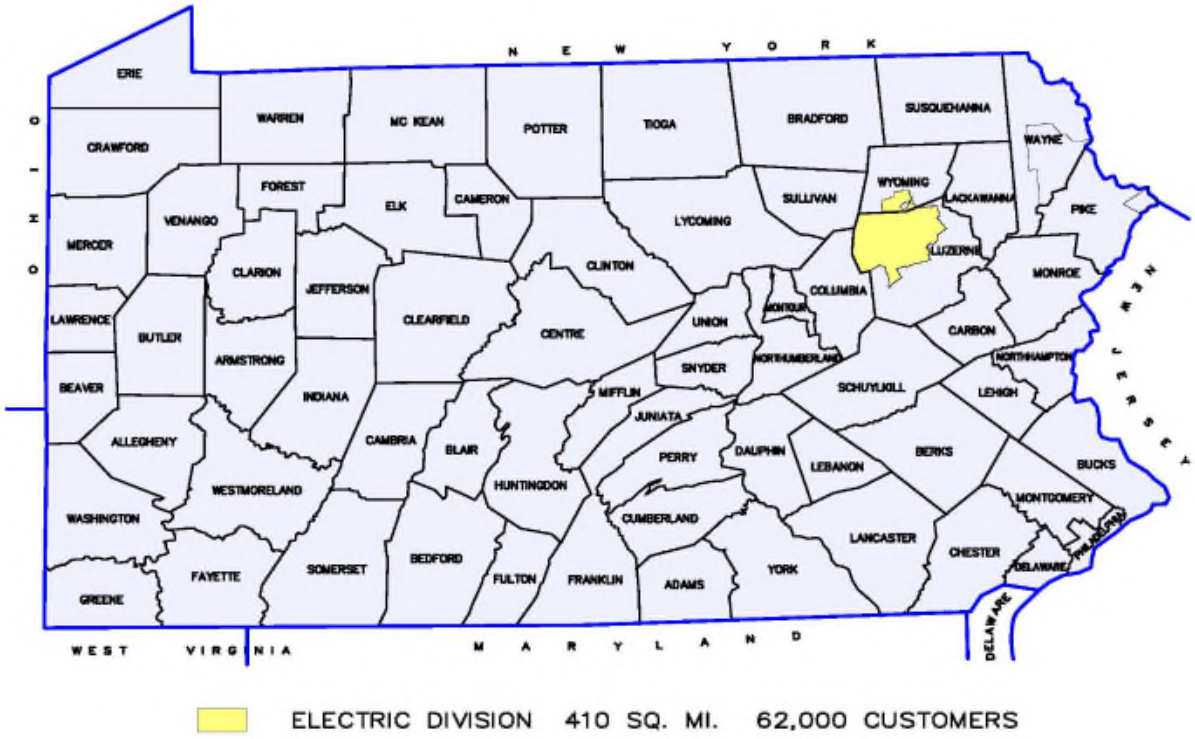
(1) Identification of the types and age of eligible property owned or operated by the utility for which it is seeking recovery;
(2) An initial schedule for the planned repair and replacement of eligible property;
(3) A general description of the location of the eligible property;
(4) A reasonable estimate of the quantity of eligible property to be improved or repaired;
(5) Projected annual expenditures and means to finance the expenditure;
(6) A description of the manner in which infrastructure replacement will be accelerated and how the repair, improvement or replacement will ensure and maintain adequate, efficient, safe, reliable and reasonable service.
(7) A workforce management and training program designed to ensure that the utility will have access to a qualified workforce to perform work in a cost-effective, safe and reliable manner.
(8) A description of a utility's outreach and coordination activities with other utilities, Department of Transportation and local governments regarding the planned maintenance/ construction projects and roadways that may be impacted by the LTIIP.

UGI-ED will address each of these in more detail below.

Corporate Background

UGI Corporation is a holding company whose principal subsidiaries, UGI Utilities, Inc., AmeriGas, Inc. and UGI Enterprises, Inc., engage in the distribution and marketing of energy products and services including natural gas, electricity, propane and butane. UGI Utilities is a public utility, providing natural gas distribution service through its Gas Division and electric distribution service through its Electric Division, subject to the jurisdiction of the Commission. UGI Utilities also owns two natural gas distribution subsidiaries UGI Penn Natural Gas and UGI Central Penn Gas, Inc. that provide service to the public subject to the jurisdiction of the Commission.

The Electric Division of UGI Utilities, Inc. is a small Electric Distribution Company ("EDC") serving approximately 62,000 customers in parts of Luzerne and Wyoming counties in Northeastern Pennsylvania. UGI-ED is predominantly a distribution company which operates and maintains over 1,200 circuit miles of overhead and underground primary distribution lines and associated equipment and twelve (12) distribution substations.



As with any public utility, safety and reliability are at the core of the service the Company provides to its customers. UGI-ED continues a long history of reliable service, as demonstrated by positive reliability performance metrics, while at the same time controlling costs, which has resulted in stable distribution rates for customers.

However, UGI-ED like many other utilities, is facing a point where accelerated investment in core distribution equipment and facilities is necessary to ensure continued safe and reliable service and to avoid potential reliability impacts due to aging infrastructure. Without the accelerated investment identified in this LTIIP, UGI-ED believes there would be increased risk to system reliability, as well as the prospect of increasing maintenance costs.

Types and Age of Eligible Property

UGI-ED has identified the following types of property as DSIC-eligible distribution infrastructure that will be replaced as part of its plan, consistent with 66 Pa.C.S. § 1351(1):

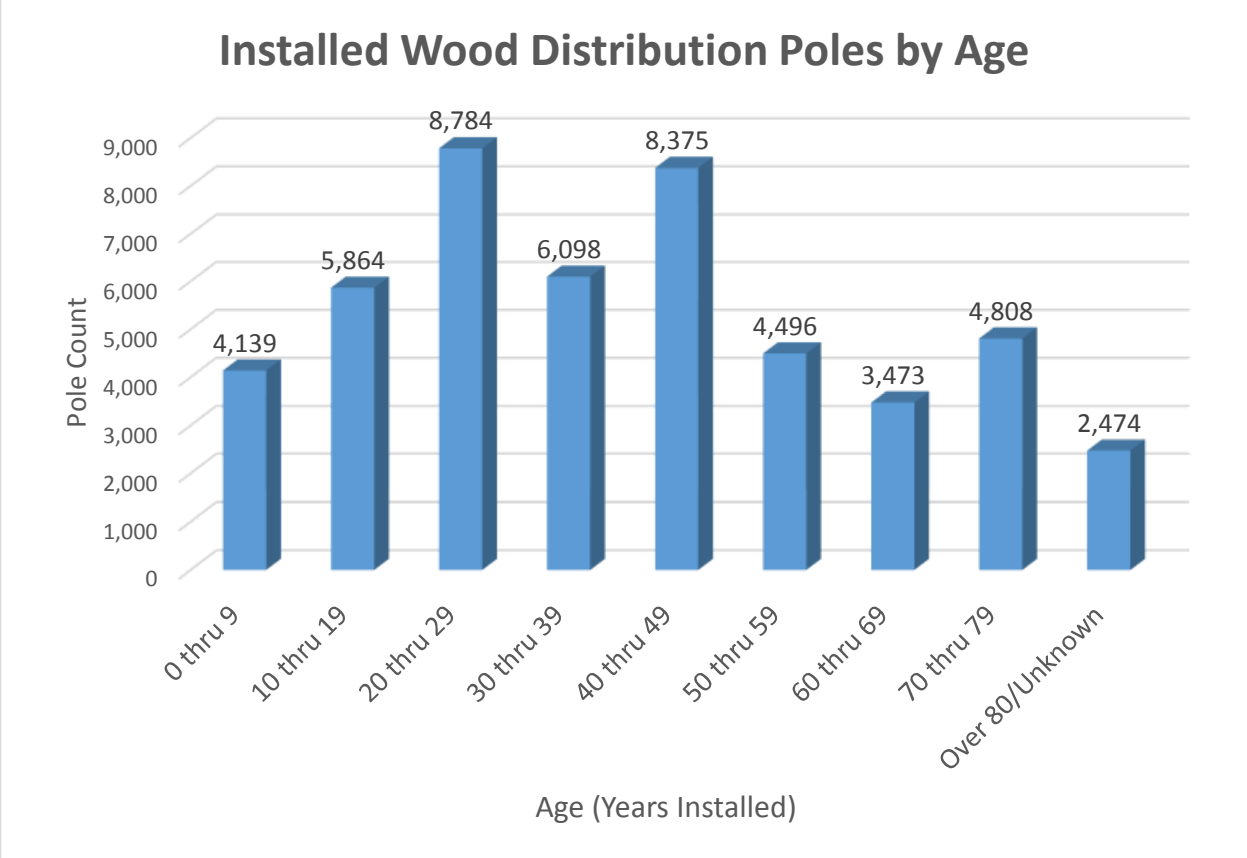
- Poles and towers.
- Overhead and underground conductors.
- Transformers and substation equipment.
- Any fixture or device related to eligible property under subparagraphs (i), (ii) and (iii), including insulators, circuit breakers, fuses, reclosers, grounding wires, crossarms and brackets, relays, capacitors, converters and condensers.

- Unreimbursed costs related to highway relocation projects where an electric distribution company must relocate its facilities.
- Other related capitalized costs – such as equipment, tools, corrosion control equipment, vehicles, and supporting information technology and any other capitalized costs that the Commission determines should be appropriately included as part of the LTIIP.

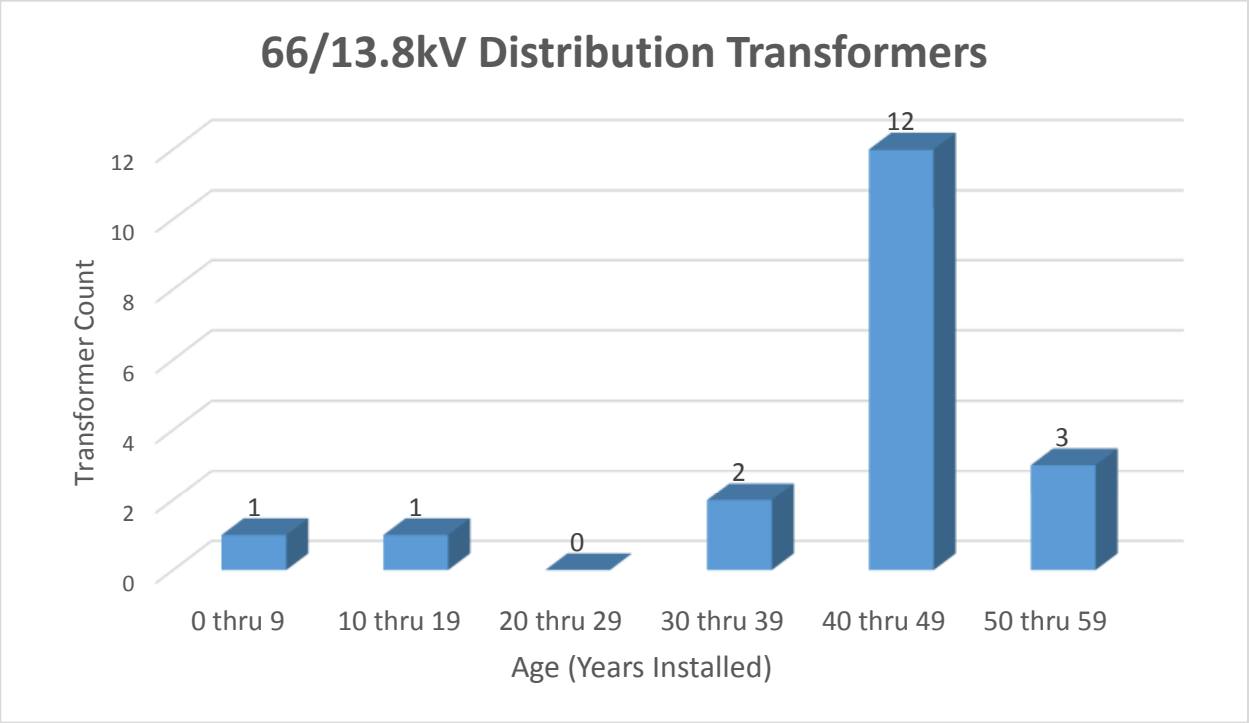
UGI-ED's LTIIP encompasses prudent and cost effective programs, focused on a global improvement to the electric distribution system, and specifically to the eligible property identified in Section 1351(1).

Over time, core electric distribution components impacted continually by mechanical, environmental and electrical stress, degrade toward a point which is no longer considered optimal for system performance. Through regular maintenance and good engineering practices, most components will continue to operate beyond this period with some expectation of increased failure rates and resulting reliability impacts. This is the primary concern with aging electric infrastructure. A significant amount of capital expenditures included in this LTIIP focus on replacing aging infrastructure. The age distribution of various UGI-ED facilities included in the LTIIP is shown below:

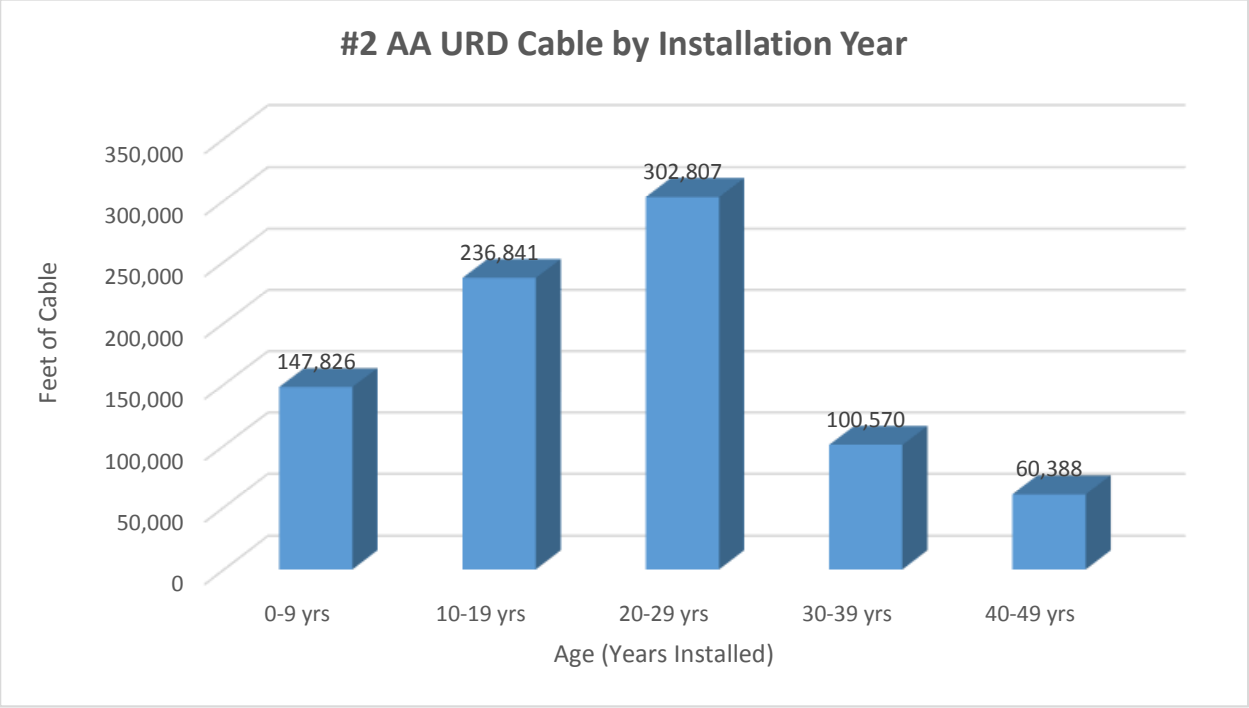
Distribution Poles (and associated appurtenances)



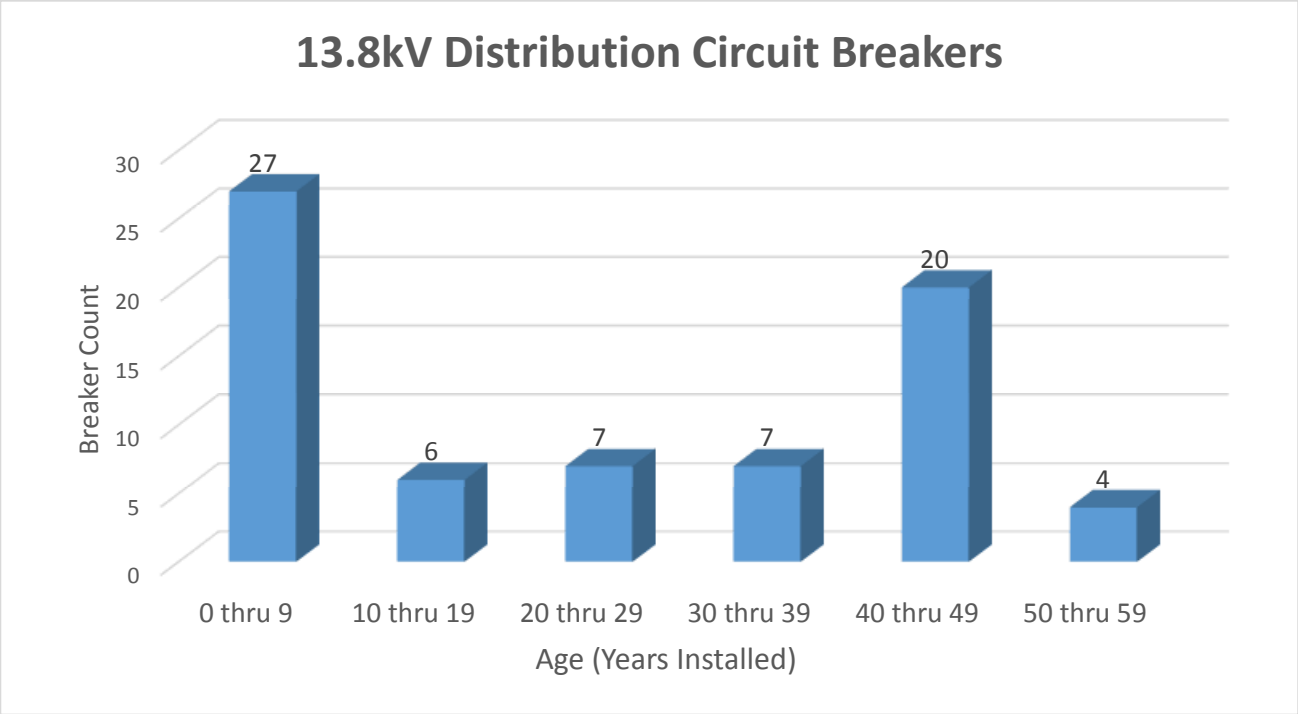
Substation Distribution Transformers



Underground Residential Cable



Distribution Circuit Breakers



With an approved LTIIP, UGI-ED expects to be in a better position to ensure the safe and reliable delivery of electric service today and in the future, commensurate with customer needs and expectations.

Reliability Focus

Reliability is primarily a function of physical lines and equipment, associated inspection and maintenance programs, operational response, vegetation management and system planning. A decline or failure in one or more of these categories will result in a corresponding long -term decline in system reliability. Correcting a downward reliability trend can take a significant amount of time due to the systemic nature of these functions and facilities, their widespread distribution throughout the Company's service territory, and the labor and capital intensive nature of the required remediation efforts. Therefore, addressing and resolving issues involves, by necessity, a multi-year approach.

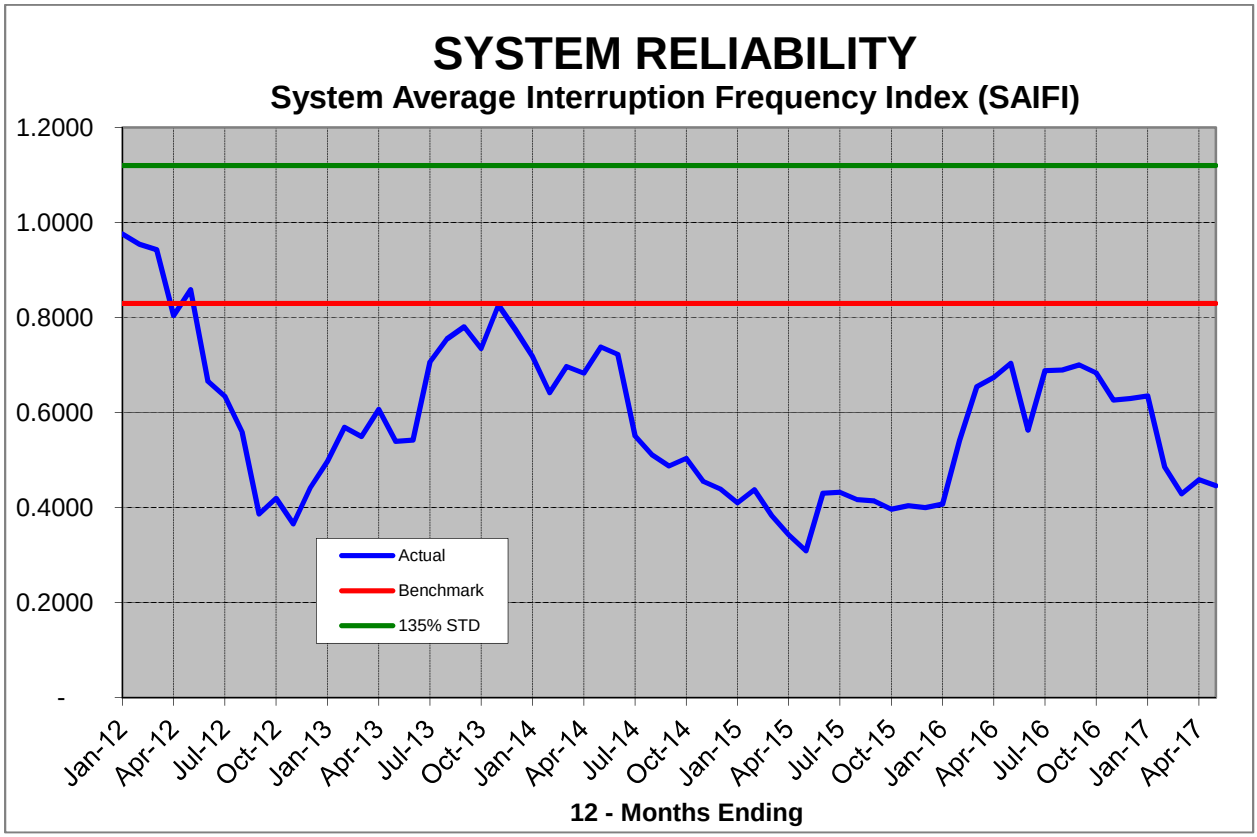
Age is only one consideration when evaluating reliability impacts. UGI-ED also relies on a comprehensive inspection and maintenance program to ensure equipment is properly maintained or replaced and to identify and prioritize maintenance issues or trends which may have an immediate or long term system impact. UGI-ED's inspection programs and goals are documented in the biennial PUC Inspection & Maintenance Plan (PUC I&M) and the Annual PUC Reliability Report. These programs include:

- Wood Distribution Pole Inspection and Treatment
- Overhead Line and Transformer Inspections
- Capacitor Inspections

- Distribution Switch Inspections
- Underground Cable Testing
- Pad Mounted Transformer & Switch Inspection & Maintenance
- Substation Circuit Breaker, Transformer & Relay Testing and Maintenance

With respect to UGI-ED's LTTIP, certain I&M programs are an immediate driver for accelerated replacement of facilities as is the case with the wood pole inspection program. In other instances, the I&M program supports the "aging infrastructure" and or reliability based initiatives by providing data necessary to develop a cost-effective replacement schedule. UGI-ED continues to demonstrate good system reliability as indicated by the positive results in all reportable reliability indices. UGI-ED has a recent history of performing better than PUC established benchmark standards (See Figure 1).

Figure 1



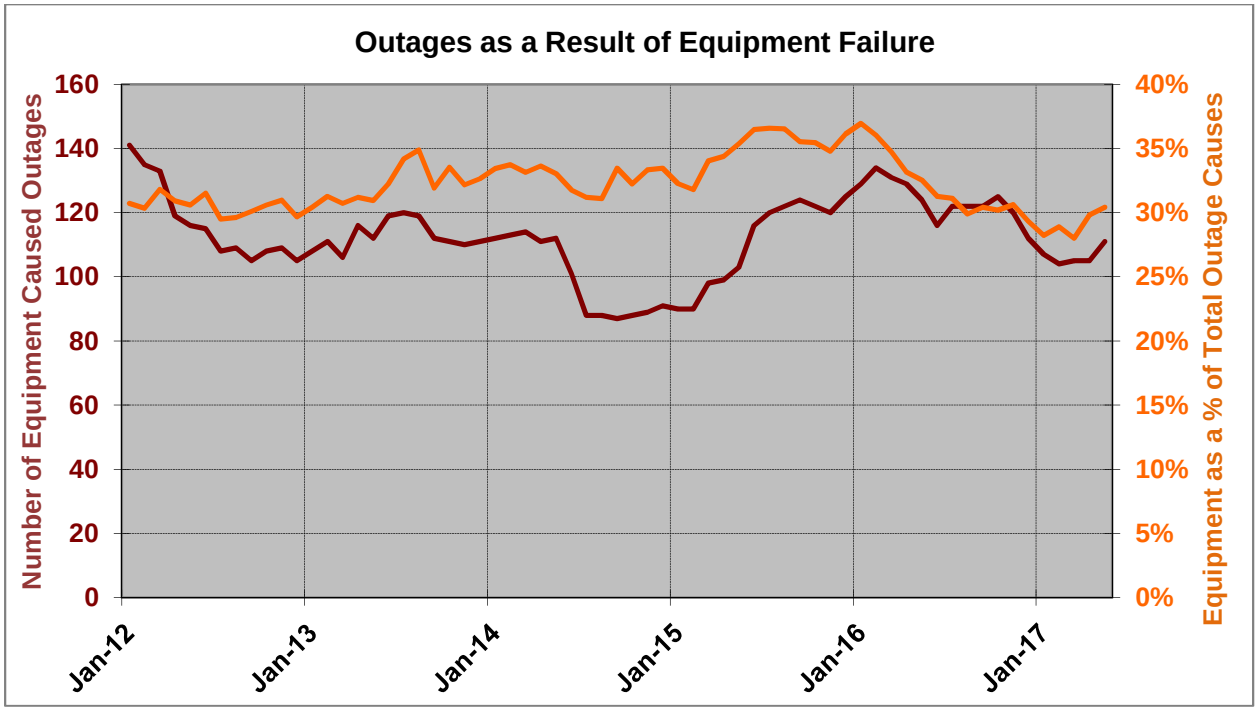
Primary drivers for this favorable trend are UGI-ED's robust vegetation management program, relatively low equipment failure rates and effective operational response by field crews and supervisors. However, to maintain current reliability levels, increased capital investment is necessary to address the long-term risk posed by aging infrastructure. In addition, incremental improvements to reliability must be addressed by proper system planning, considering operational flexibility and the use of new technologies which can reduce the scope and duration of outages.

UGI-ED has already undertaken an accelerated focus on infrastructure and implemented several infrastructure and technology-based reliability programs including accelerated underground cable and wood pole replacement, Distribution Automation (DA), enhanced feeder sectionalizing and primary substation tie-line additions. These programs have been developed to address significant long-term reliability factors. Considering these programs and the additional programs documented in the UGI-ED LTIIP, UGI-ED fully expects to improve overall system reliability and, to some extent, smooth out historical weather-related variability.

Need for an LTIIP

The Long-Term Infrastructure Improvement Plan and associated Distribution System Improvement Charge (DSIC) are intended to provide a mechanism for utilities including Electric Distribution Companies (EDC) like UGI-ED, to accelerate their infrastructure repair and replacement programs by supporting more timely recovery of approved infrastructure investments aimed at modernizing and improving distribution systems. UGI-ED, like other utilities, faces an aging infrastructure issue affecting key system components such as wood poles, underground cable, circuit breakers and substation transformers. Globally much of the core UGI-ED distribution system is over 40 years old. Although equipment related outages have remained somewhat constant over the last 10 years (See Figure 2), given the current age of many of these components the expectation and the industry norm is to see gradually increasing failure rates.

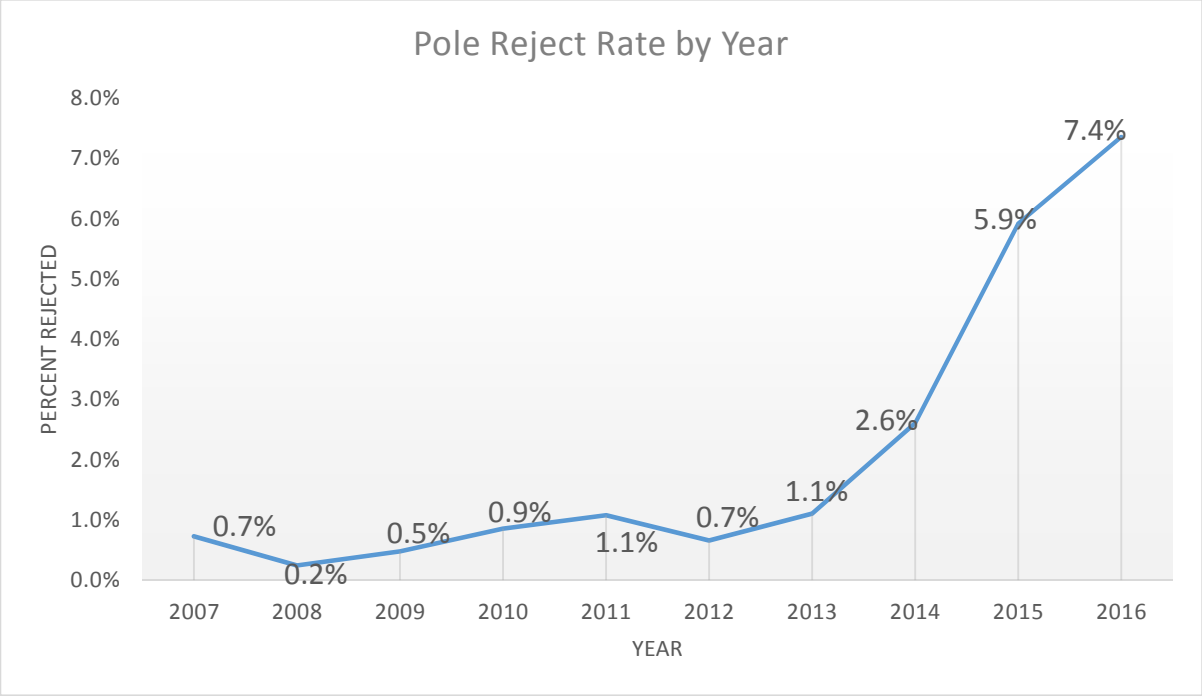
Figure 2



UGI-ED's distribution wood pole inventory, which has an average age of 40 years, is an example of the aging infrastructure issue. As documented in UGI-ED's PUC I&M Plan, all wood poles are inspected on a

12-year cycle. This process includes both visual and physical inspections to determine a pole's condition and capacity to perform as designed. Although UGI-ED has a comprehensive inspection and maintenance program, indications of age-related issues have been observed during recent annual inspections which saw a significant increase in reject rates over the last three years (See Figure 3).

Figure 3



Similarly, UGI-ED's 66/13.8kV power distribution transformers have an average age of 41 years with 63% of the units exceeding 40 years old. Although properly maintained, UGI's aging power transformers are subject to an increased risk of failure. In addition, several are showing signs of problems such as elevated levels of dissolved gas. Considering a substation transformer outage can impact thousands of customers, and the significant time required to manufacture and replace transformers, a prioritized and accelerated replacement schedule is warranted.

Finally, increased investment in technology and system planning-based reliability enhancements included in the LTIIP will have immediate and long-term impacts on reducing customer outage minutes and frequency. This includes UGI-ED's ongoing feeder sectionalizing initiative which is intended to reduce the number of customers impacted by a single outage by limiting the number of customers under individual protection devices or manual switches. The sectionalizing/automation goal is to place a maximum of 500 customers under a single device. This project also includes Distributed Automation which will provide for remote monitoring and control of field devices (i.e. OCRs) reducing switching times and providing valuable data to UGI's distribution planning engineers and system operations personnel.

UGI-ED will continue to rely on various I&M programs coupled with the tracking of equipment failures, to monitor the overall "health" of core UGI-ED facilities as they age. UGI-ED recognizes that without active intervention the pace of failures and replacements may outpace its capacity to respond in a cost-efficient manner with potential impacts to reliability and the safety of customers and employees. The individual programs identified to address aging infrastructure and other appropriate reliability initiatives are discussed in Appendix A.

Implementation of the LTIIP

As good utility practice, UGI-ED continually makes infrastructure investments to address aging infrastructure, reliability improvements and to deploy beneficial technology enhancements. This is evidenced by historical and ongoing projects included in this proposed LTIIP related to wood pole and underground cable replacement, secondary modernization, lower voltage conversions, distribution sectionalizing and primary reconductor projects. In 2016, UGI-ED significantly accelerated capital expenditures in two key areas, wood pole and underground residential cable replacements. In total, investment in these two areas increased by over $1.3 million dollars or 247% versus the average investment during the baseline period from 2012 through 2015. Approval of the UGI-ED LTIIP will enable UGI to maintain and/or further accelerate the infrastructure improvements and repairs necessary to ensure safe, reliable and efficient delivery of electric service to our customers.

UGI-ED is proposing a five-year LTIIP covering the period from 2018 through 2022. Increased capital investment associated with specific LTIIP programs is planned to exceed $4.0 million annually compared to average spending over the baseline period from 2012 through 2015. Primary drivers for the increased spending are replacement of wood poles, underground cable replacement, major system improvement projects and substation transformer replacements. These programs are aimed at addressing critical aging infrastructure issues before significant failures and increased customer outages occur. In addition, based on system planning recommendations, new facilities will provide operational flexibility or sectionalizing to limit the number of customers impacted by individual outages. Table 1 shows UGI-ED's historical and projected capital spending levels under the proposed LTIIP.

Table 1

Annual LTIIP Expenditures (dollars in thousands)								
				Proposed 5-year LTIIP Plan				
Capital Investment Period (Fiscal Year)	2012-2015 (Baseline)	2016 (Actual)	2017 (Forecast)	2018	2019	2020	2021	2022
Replacement & Betterment	$3,528	$5,710	$6,156	$7,646	$7,766	$8,012	$8,152	$8,263
Capital Increase over Baseline Period	N/A	$2,182	$2,628	$4,118	$4,238	$4,484	$4,624	$4,735
% Increase over Baseline Period	N/A	62%	74%	117%	120%	127%	131%	134%

Individual LTIIP program budget schedules are provided along with the specific program details in Attachment A. Core LTIIP programs such as pole replacements, URD re-cabling and transformer replacements are intended to address aging infrastructure before reliability is impacted. The results of these core programs are anticipated to be reflected in a continuation of UGI-ED's excellent reliability statistics. To validate this expectation, UGI-ED will track and measure the performance of the various distribution programs with respect to reliability benefits and cost effectiveness. On an annual basis, the impact to reliability will be measured by comparing historical and post plan implementation reliability indices on a per feeder basis. In addition to reliability, UGI-ED will utilize a competitive bid process where appropriate, to acquire construction resources and material to ensure the expected benefits are achieved in a cost-effective manner.

Access to Qualified Workforce

The UGI-ED workforce has traditionally been a mix of fulltime company and contractor resources. Most overhead distribution capital work measured from both an expenditure and volume standpoint relies predominately on the larger contractor workforce. The composition of the workforce is managed to accommodate planned capital projects, routine maintenance activities, anticipated new business growth and typical weather-related outages.

Training is an essential component of any utility workforce. UGI-ED is subject to the training requirements set forth in the Occupational Safety and Health Administration (OSHA) Regulation 29 CFR §1910.269 Electrical Power Generation, Transmission and Distribution in addition to internally developed training programs. With respect to overhead line maintenance and construction, UGI-ED only hires fully qualified Journeyman linemen. Within the UGI-ED Substation Department, on the job training via supervision and senior personnel provide for a progression through the various job positions and associated qualifications. Employees also participate in OSHA 1910.269 refreshers and reviews of applicable safety-related work practices and procedures. This, coupled with regular supervisor inspections, ensures employees are qualified and complying with all safety related work practices.

Contractor Workforce

A significant portion of LTIIP related programs including pole replacements, PennDOT relocations, and primary tie-line distribution projects have traditionally and are planned to continue to be been handled by UGI-ED's contractor workforce. Flexibility under the existing line construction agreement allows UGI-ED to scale the contractor workforce to meet emergent resource requirements including those associated with active or proposed LTIIP programs. Currently UGI-ED employs seven (7) contractor crews totaling 28 full-time resources. This workforce was increased by seven (7) additional full time resources during the 2016 -2017 time period to support the acceleration in planned capital work. UGI-ED typically renews the contractor resource agreement through a competitive bid process every three to five years, the next being late 2018. UGI will continue to utilize a competitive procurement process to ensure a safe and cost-efficient utilization of the contractor workforce.

Beyond traditional overhead line construction work, UGI-ED employs additional qualified contractors paired with internal UGI-ED employees to perform more specialized work such as URD re-cabling projects and substation upgrades. With respect to URD re-cabling projects, UGI-ED recently approved several new contractors for inclusion in the bid process which will provide for sufficient resources and competitive pricing to complete proposed re-cabling projects. Contractor resources will also be utilized to supplement UGI-ED resources, as necessary, for substation specific LTIIP projects. Again, depending on the magnitude of the project, UGI-ED utilizes a competitive bid process for qualified contractors to evaluate and select appropriate resources.

In all cases where contractor personnel work independently of qualified UGI-ED supervision, contractors must confirm and acknowledge during the bid process that employees are OSHA 1910.269 qualified and only those employees will work in restricted areas. UGI-ED also reviews contractor safety and training records, safety rules and programs, drug and alcohol policies and OSHA 300 Logs prior to making a contractor selection. Once on property, UGI-ED requires contract line construction employees to participate in De-Energizing Lines and Equipment training which qualifies the employee to become a "tag-holder" as part of the electric permit process. This training also provides information on UGI facilities, distribution equipment and the standard communication protocols between System Operations and field personnel, particularly during switching operations and system emergencies. UGI-ED also sponsors training on equipotential grounding for all field personnel responsible for installing or overseeing the installation of grounds to de-energize electric conductors.

UGI-ED employs a company supervisor that has direct oversight responsibility for contractor performance including quality, safety, efficiency and billing activities. All personnel, whether company or contractor, have "stop-job" authority if a safety concern is identified, after which UGI-ED operations and safety personnel would investigate and address as necessary. To further support the overall safety and training goals with respect to the contractor workforce, and UGI-ED as a whole, UGI-ED now maintains a dedicated electric safety and training resource. This employee oversees the advancement of electric specific safety policies and procedures.

UGI-ED also initiated a construction quality control program which samples both contractor and company line work. The program evaluates several key areas when reviewing the final as-built product including overall quality, compliance with construction and safety standards as well as "as-built" versus original design variances. Identified issues are compiled and discussed with the operations team to identify the source of the issue and the subsequent resolution, which may be additional training or even changes to construction standards.

UGI Workforce

The UGI-ED line distribution workforce is comprised of ten (10) Journeymen linemen that perform a more versatile mix of capital and maintenance projects along with a customer troubleshooting function. These employees are typically utilized to complete less extensive capital projects such as single point equipment installations or replacements. The division of work between contractor and Company crews is necessary to provide enough flexibility to ensure adequate and timely resources are available to address non-LTIIP-related maintenance and capital projects including new business installations. UGI-ED also employs five (5) fulltime substation employees supported by in-house engineering and supervision

to complete planned substation maintenance and capital improvements. Again, this workforce is supplemented as necessary with both internal and external contractor resources.

Coordination with PennDOT and Local Municipalities

Where UGI-ED facilities are located in PennDOT or local municipality-owned roads or other public places, UGI-ED will obtain all required permits, and through the permitting process will address any traffic control or restoration requirements. Overall, UGI-ED does not believe its proposed LTIIP programs will have a significant impact on PennDOT or local communities. Where the opportunity is presented to UGI-ED, for example upon notice from PennDOT of potential relocations, the Company will proactively seek to work with agency and local officials to reduce the cost and impact to the local community of any necessary projects.

Conclusion

UGI-ED's proposed LTIIP is primarily intended to address, at an accelerated rate, core aging infrastructure replacement. As detailed above and in Appendix A, UGI-ED like most EDCs, has a distribution system designed and installed many decades ago which was expanded and upgraded as necessary to serve new and increasing customer load. Without accelerated investment resulting in the expedited and strategic replacement of facilities, the sheer magnitude of the aging infrastructure will eventually overwhelm traditional replacement programs, impacting the Company's ability to provide safe and reliable service. In response UGI-ED has already accelerated key infrastructure replacements and is proposing several additional programs. An approved LTIIP will enable UGI-ED to stay ahead of the aging infrastructure curve and provide for additional reliability enhancements such as targeted distribution automation. An approved LTIIP will also permit UGI-ED to pursue a Distribution System Improvement Charge (DSIC) recovery mechanism in the future.

Appendix A lists proposed LTIIP projects and corresponding projected capital expenditures for the 2018 to 2022 period. If approved, UGI-ED expects to meet the capital expenditure schedule baring any significant factors such as major storm events or unforeseen regulatory requirements.

Appendix A

	Baseline (avg)	Actual	Budget	Planned Expenditure Schedule (dollars in thousands)					Plan Year Total
LTIIP Program Initiatives	2012-2015	2016	2017	2018	2019	2020	2021	2022	
Wood Pole Replacements	$187	$1,122	$1,000	$1,000	$1,100	$1,300	$1,400	$1,500	$6,300
Wood Pole Reinforcements	$9	$83	$40	$48	$48	$49	$49	$50	$244
URD Cable Replacements	$346	$727	$900	$1,000	$1,000	$1,000	$1,000	$1,000	$5,000
Secondary Modernization	$452	$740	$500	$573	$573	$573	$573	$573	$2,865
Distribution Failed OH Equipment	$1,025	$838	$1,030	$1,100	$1,100	$1,100	$1,100	$1,100	$5,500
Porcelain Insulator & Cutout Replacements	$19	$0	$0	$50	$50	$50	$50	$50	$250
Replacement and Improvement of Services	$180	$130	$170	$170	$170	$170	$180	$180	$870
Facility Relocations (PennDOT)	$334	$684	$331	$465	$465	$465	$465	$465	$2,325
Right of Way Reliability Relocations	$37	$167	$100	$100	$100	$100	$100	$100	$500
Major System Improvement Projects	$729	$968	$1,535	$1,900	$1,900	$1,900	$1,900	$1,900	$9,500
Distribution Sectionalizing	$90	$58	$100	$100	$100	$100	$100	$100	$500
Distribution Automation	$8	$73	$200	$260	$260	$260	$260	$260	$1,300
8kV and 4kV Distribution System Conversions	$77	$0	$125	$125	$125	$150	$150	$150	$700
Replace Failed UG Secondary & Service Cable	$25	$53	$75	$75	$75	$75	$75	$75	$375
Distribution Relay Replacements	$1	$0	$0	$60	$60	$60	$60	$60	$300
Distribution Circuit Breaker Replacements	$10	$65	$50	$140	$140	$140	$150	$150	$720
Substation Transformer Replacements	$0	$0	$0	$480	$500	$520	$540	$550	$2,590
Total	$3,528	$5,707	$6,156	$7,646	$7,766	$8,012	$8,152	$8,263	$39,839

Distribution Pole Replacements

Program Description and Purpose

This ongoing program was established to identify and replace UGI-ED wood poles based on condition, age or construction requirements. The purpose is to ensure installed wood poles have a manageable service life while meeting current construction and clearance standards. Most replacements are identified during the annual pole inspection and treatment program. However additional poles may be targeted based on company records or via general field observations by Company employees during normal work or patrols. Pole replacements are necessary when deterioration or damage is sustained which weakens the pole, clearance requirements cannot be achieved, construction specifications are updated or minimum strength requirements can no longer be maintained to support the attached facilities. The replacement program improves public and employee safety and overall system reliability.

Background/Justification

UGI-ED has over 45,000 wood distribution poles spread across a mainly rural service territory. Pole material varies, but the majority of poles are either Southern Pine or Western Cedar. The average pole age is 40 years old with nearly 14,000 poles greater than 50 years old. The current inspection and treatment cycle per the UGI-ED I&M Plan is 10 to 12 years. During the period from 2004 through 2013 UGI-ED identified an average of 30 reject poles per year (less than 1%). In 2014, 2015 and 2016 reject rates rose to 2.6%, 5.9% and 7.4% respectively, which resulted in a combined 658 reject poles based on the inspection population. A percentage of these rejects could be reinforced by way of C-truss methods which mitigated the total replacement volume.

Given the increased rejection rate and the age of the UGI-ED pole inventory. UGI-ED accelerated the rate of targeted pole replacements to 165 in 2016 and proposes to continue at a rate of between 150 and 200 poles per year in subsequent years. This targeted replacement rate combined with an increase in pole reinforcements will ensure a reliable and manageable pole infrastructure into the future.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Planned Replacements	34 (avg)	150 – 200	150 - 200	150 – 200	150 - 200	150 – 200
Expenditures ($ thousands)	$187 (avg)	$1,000	$1,100	$1,300	$1,400	$1,500

Locations

Replacement locations are driven mainly by the pole inspection and treatment program locations listed biennially in the UGI-ED I&M Plan. In addition, system-wide vegetation and line inspection patrols conducted by UGI-ED employees under the UGI-ED I&M Plan along with analysis of company records to evaluate age and construction, will identify an additional number of replacements.

Distribution Pole Reinforcements

Program Description and Purpose

In conjunction with UGI-ED's wood pole replacement program, pole reinforcement via steel truss bracing and fiber-wrap techniques, plays an important role in maintaining a serviceable installed pole inventory. Pole reinforcement is an ongoing UGI-ED program which can restore pole strength and extend service life at a significantly lower cost than replacement. Poles suitable for reinforcement are identified during the annual pole inspection and treatment program. As with replacements, pole deterioration or damage which reduces the overall pole strength is the primary driver for consideration under this program.

Background/Justification

Pole reinforcement has a proven track record of providing a low-cost solution for maintaining pole integrity and extending service life. UGI-ED utilizes both steel truss bracing and, to a lesser extent, fiber-wrap to reinforce damaged or deteriorated poles. Steel-truss bracing which is the most common and least expensive restoration method, involves driving a single or double steel member (truss) into the ground alongside the pole and banding the truss to the pole. Fiber-wrap is more-costly and is used when steel truss restoration is not allowed (state highway right-of-way) or would not be effective or impractical due to overhead obstructions. Candidates for restoration are identified during the annual pole inspection and treatment program where they are classified as restorable or non-restorable. Typically, restorable poles have limited degradation near the ground line and can be restored to at or near full strength with either restoration method.

UGI-ED has over 45,000 wood distribution poles spread across a mainly rural service territory with an average pole age of 40 years. The current inspection & treatment cycle per the UGI-ED I&M Plan is 10 to 12 years. Results from recent inspections indicated an average rejection rate of 5.3% over the last three (3) years, of which 25% of rejected poles were deemed to be restorable based on UGI-ED evaluation criteria. The final decision to replace or restore is based on an engineering review which considers additional factors such as location, current construction, overall age and condition, and existing and proposed attachments.

Historically, given a lower reject rate (<2%), UGI-ED has reinforced approximately 10 poles per year. In recent years, rejection rates have begun to increase as a result of pole age. As a result, UGI-ED significantly accelerated pole replacements and correspondingly, pole reinforcements. Pole reinforcement offers a substantial savings over replacement costs and takes significantly less time to complete, allowing for more reinforcements to be completed annually.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Planned Reinforcements	12(avg)	50-70	50-70	50-70	50-70	50-70
Expenditures ($ thousands)	$9(avg)	$48	$48	$49	$49	$50

Locations

Candidates for reinforcement are identified during the annual inspection and maintenance program.

Underground Primary Cable Replacement/Restoration

Program Description and Purpose

This program will accelerate the replacement or restoration of underground primary, secondary and service cable, that serves over 5,000 UGI-ED customers through nearly 200 underground (UG) systems, primarily installed in underground residential developments (URD's). In total UGI-ED has installed over 800,000 feet of underground primary cable over the last 50 years. UGI-ED has a mix of radial-fed and loop UG systems. UG cable failures often result in extended customer outages, particularly on radial systems due to the length of time needed to locate, excavate and repair the cable. Complete replacement of older UG cable systems or restoration via cable injection methods, will improve overall customer reliability by eliminating or restoring the degrading cable and, in the case of replacement, provide new opportunities for developing switching/sectionalizing points to reduce outage times.

Background/Justification

The average life expectancy of UG cable is between 40 and 50 years. Over 60% of the cable installed on the UGI-ED system is at least 30 years old. UGI-ED has installed a variety of cable types over the years, including a large amount of direct buried with bare concentric neutral. UGI-ED performs primary neutral testing on a 10-year cycle as part of our normal maintenance activities, along with basic tracking of cable type, age and installation method. Over the last five years UGI-ED has replaced over 41,000 feet of primary cable. These projects have historically focused on known reliability issues and/or cable sections with poor test results.

Given the overall age of underground primary cable on the UGI-ED system, and the large percentage of direct buried bare concentric neutral, the number of in-service primary cable failures and failed neutral inspections is expected to increase. This expected increase would be in-line with industry trends. As a result, UGI-ED accelerated the replacement of UG cable in 2016, increasing capital investment by 110% over the baseline period, and replacing over 23,000 feet of primary, secondary and service cable. This acceleration will improve or maintain current reliability statistics and ensure that in-service failures do not exceed operational capabilities. The program is currently focused on direct buried, bare concentric neutral cable installed between 1968 and 1982. UGI-ED is also incorporating cable injection methods, where applicable, to restore the insulation quality of existing cables. Cable injection provides a lower cost option where conditions permit. At a minimum, UGI-ED expects to continue at an accelerated replacement/restoration rate until all bare concentric cable is replaced. The Company anticipates that all bare concentric cable will be replaced over the next five years.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Expenditures ($ thousands)	$346(avg)	$1,000	$1,000	$1,000	$1,000	$1,000

Locations

In addition to the current process of identifying cable replacement projects based on in-service failures (known reliability issues) and neutral testing, UGI-ED will focus on the replacement of the oldest facilities which are primarily direct buried bare concentric neutral type installations.

Distribution Sectionalizing

Program Description and Purpose

The UGI-ED Distribution Sectionalizing Enhancement Program began in 2013, with the goal of reducing customer outage minutes through the addition of both automatic and manual distribution sectionalizing devices. The program is primarily focused on the installation of traditional, non-communication assisted equipment on single phase and multi-phase circuit elements. This includes reclosers, air-break switches, fuses, disconnects and fault detectors. The addition of each device is intended to limit the number of customers exposed to a single outage or to reduce outage durations via identifying and sectionalizing faulted sections.

Background/Justification

The UGI system has evolved over time from a multi-voltage system with numerous stepdown substations at 8kV and 4kV to a primarily single distribution voltage system. As these substations were converted some existing points of sectionalizing were removed. In 2013, UGI-ED began a program to patrol each of the 41 overhead feeders to identify appropriate points for the addition of new sectionalizing devices. To date 26, or 63%, of the feeders have been patrolled. The patrols are performed by UGI-ED vegetation and system planning personnel, and locations are determined based on customer concentration, logical sectionalizing points, vegetation risk, and protection coordination requirements. As a result of the ongoing program, 142 new devices have been installed and an additional 45 devices/locations have been identified.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	20222
Planned Installations	29(avg)	20-40	20-40	20-40	20-40	20-40
Expenditures ($ thousands)	$90(avg)	$100	$100	$100	$100	$100

Locations

Locations for the addition of new sectionalizing devices are prioritized based on the worst performing circuits, and the ability to minimize potential customer interruption minutes.

Right-of-Way Reliability Relocations

Program Description and Purpose

This program is focused on the relocation of primary conductors to road right-of-way, which will improve reliability and restoration times. UGI-ED continually looks for opportunities to relocate sections of the primary distribution system currently routed through rural or "rear-lot" right-of-way which may be subject to lower reliability and longer restoration times.

Background/Justification

Select sections of the primary distribution system, particularly single phase primary in rural areas, was extended along off-road right-of-way, to serve a limited number of customers and then expanded as load growth in those areas continued. As compared to on-road right-of-way facilities, restoration requires a significant amount of manual effort due to limited or no vehicle access. This type of restoration also increases the safety risk to field personnel during restoration work.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Planned Projects	2(avg)	2-4	2-4	2-4	2-4	2-4
Expenditures ($ thousands)	$37(avg)	$100	$100	$100	$100	$100

Locations

Right-of-way relocation projects are identified based on field inspections and feeder-based reliability metrics.

Secondary Modernization

Program Description and Purpose

This program focuses on the replacement of mainly open-wire secondary and service distribution conductors and, as necessary, the associated transformers. The existing open-wire conductors are replaced with a modern triplex wire to reduce space utilization on the pole, increase reliability, and are sized with respect to capacity to accommodate existing and future load growth.

Background/Justification

Much of UGI-ED's overhead secondary supply system was installed in the 1960's and 1970's and was designed to accommodate then current customer loads and load growth over a projected horizon. Over the last 30 years the secondary supply system has become overloaded in some areas resulting in voltage issues and or outages due to overloaded and failed transformers, and open-wire construction which is more susceptible to outages due to deterioration of the wire covering.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Expenditures* ($ thousands)	$452(avg)	$573	$573	$573	$573	$573

*The number of planned projects varies annually depending on location and scope of project.

Locations

Upgrade priorities are identified by power quality issues, customer calls, field inspections focused on reliability and/or safety, internal transformer loading reports and outages. Many of UGI-ED's more urban areas are prime candidates for this program due to the age and the extent of the open-wire secondary supply system. The annual number of secondary projects are based on emergent needs and a defined replacement plan.

Overhead Distribution Equipment Repair & Replacement

Program Description and Purpose

This program focuses on the replacement of failed or deteriorated overhead distribution equipment. This primarily includes poles and conductors, reclosers, sectionalizers, switches, transformers and capacitors.

Background/Justification

Distribution system components are subject to failure due to a variety of causes including age-related deterioration, physical damage, thermal overloads, malfunctions, etc. These failures often result in customer outages or service quality issues requiring immediate repair or replacement. In addition, field inspections, both planned and as a course of normal work activities, serve as a secondary source for identifying failed or damaged equipment.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Expenditures ($ thousands)*	$1,025(avg)	$1,100	$1,100	$1,100	$1,100	$1,100

*Forecasted expenditures are based on an historical average.

Locations

As this category encompasses equipment utilized across the UGI-ED service territory, locations will be identified as failures occur, as well as resulting from field observations/investigations.

Replace Failed Underground Secondary and Service Cable

Program Description and Purpose

This program focuses on the replacement of failed underground residential secondary and service cable.

Background/Justification

Failed or deteriorated underground secondary/service cable will result in a full or partial customer power outage or power quality issue. Underground secondary and service cable was installed in conjunction with the build-out of the primary cable system in underground residential developments. As a result, a significant amount of this cable has been in-service for 30 or more years. Replacements are identified via customer calls related to electric service issues.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Expenditures ($ thousands)*	$25(avg)	$75	$75	$75	$75	$75

*Forecasted expenditures are based on historical costs considering an increasing trend in failures.

Locations

As this category encompasses underground cable installed throughout the UGI-ED service territory, locations will be identified as failures occur.

Major Distribution System Improvement Projects

Program Description and Purpose

This program focuses primarily on planning based projects supporting the creation of new circuit ties between substations, development of new substations and feeder circuits to improve reliability, and adds capacity and replacement of legacy primary conductors mainly on the backbone distribution system with higher capacity wire, such as 397.5 ACSR.

Background/Justification

These large-scale projects, which may span multiple years, are initiated and/or approved by distribution planning to address current and forecasted load growth and reliability issues such as worst performing circuits. System planning is focused on reliability based projects that create multiple sources into load centers to provide for sectionalizing and faster service restoration. In addition, much of UGI-ED's three-phase primary distribution system was originally constructed using copper conductors, primarily #1 and 1/0 Cu. This is particularly true in areas where lower voltage (8kV and 4kV) distribution substations were built in urban areas in the 1940s, 50s and 60s. As load increased and facility upgrades became necessary, updated construction standards and modern conductors have been utilized to provide additional capacity and to improve reliability.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Planned Projects	3(avg)	3-6	3-6	3-6	3-6	3-6
Expenditures ($ thousands)	$729(avg)	$1,900	$1,900	$1,900	$1,900	$1,900

Locations

Projects are identified as part of the annual distribution planning review or based on operational/reliability issues.

Facility Relocation Projects (PennDOT)

Program Description and Purpose

This program is associated with the relocation of electric facilities impacted by highway and bridge projects initiated by the Pennsylvania Department of Transportation (PennDOT) or other state and local agencies.

Background/Justification

As necessary, UGI-ED works with state and local agencies, primarily PennDOT, to relocate electric facilities to provide for construction access and in most cases expanded road and bridge right-of-way. UGI-ED must comply with relocation timelines and is responsible for all incurred costs including acquisition of private right-of-way, if necessary. Costs associated with this program are only those costs associated with unreimbursed portions of the total project cost. The frequency and number of relocation projects varies annually depending on requests.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Expenditures* ($ thousands)	$334(avg)	$465	$465	$465	$465	$465

* Unreimbursed cost projections based on historical average.

Locations

Location for these projects are dictated by the interested entity.

Distribution Automation

Program Description and Purpose

This program is focused on the deployment of intelligent, communication enabled, protection, power quality and remote monitoring devices to key areas of the distribution system. The program will provide a number of customer benefits including reduced outage times, improved power quality, faster and more accurate outage identification and an enhanced ability to monitor and control remote field devices during emergency situations.

Background/Justification

The extent of UGI-ED's real-time visibility of the distribution system ends at the individual substation feeder breaker. Beyond the circuit breaker, normal system conditions such as device status, voltage and loading must be gathered/confirmed by field visits. In addition, switching of 3-phase devices such as circuit tie-reclosers and air-breaks requires a crew dispatch, which can take more than an hour during off-shift periods, ultimately extending sectionalizing times and corresponding outage minutes. UGI-ED has already successfully implemented, under a pilot program, the technology to securely and reliably monitor and control a number of automatic circuit reclosers (ACRs). This program will continue the deployment of new "smart devices" such as ACRs and fault detectors along with the necessary communication network, in addition to extending the remote monitoring and control capability to existing devices including voltage regulators and distribution capacitors. Ultimately the additional real-time device status information will be integrated with the UGI-ED Outage Management System to provide a more accurate and much quicker picture of outage cases during storm events.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Planned Installations*	3(avg)	6-8	6-8	6-8	6-8	6-8
Expenditures ($ thousands)	$8(avg)	$260	$260	$260	$260	$260

* Number of installations depends on type, new versus upgrade, location, and operational requirements.

Locations

UGI-ED has nearly 80, 3-phase automatic circuit reclosers which will serve as the primary focus of future deployment efforts. These devices are already situated in critical locations based on their protection functionality and/or use as a tie-recloser between adjacent feeders. These locations will be prioritized based on frequency of operation, customer count (load) and cellular communication availability.

Porcelain Cutout and Insulator Replacements

Program Description and Purpose

This program is associated with the replacement of porcelain distribution cutouts and porcelain insulators. Utilized in a variety of applications, including transformer and line protection, porcelain cutouts and insulators are being replaced with polymer style cutouts and insulators, which are less susceptible to damage from handling and extreme cold temperatures.

Background/Justification

Porcelain cutouts and insulators have long been a standard within the utility industry. Porcelain is more brittle and susceptible to moisture ingress and subsequent cracking/failure during extreme cold periods. With the advent of polymer, UGI-ED transitioned to requiring polymer cutouts on all new installations and as replacements for failed porcelain installations around 2010. Based on elevated failure rates, UGI-ED proactively replaced all porcelain cutouts of a specific type over the last 10 years. However, a significant number of porcelain cutouts and insulators remain on the UGI-ED system. Specifically, cutout failures can result in pole fires and customer outages. Replacement of porcelain cutouts and insulators will improve overall system reliability.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Replacements	38(avg)	50-80	50-80	50-80	50-80	50-80
Expenditures ($ thousands)	$19	$50	$50	$50	$50	$50

Locations

Locations subject to replacement will be identified via results of the annual inspection program and prioritized based on the number of customers impacted and density of installations.

8kV and 4kV Distribution System Conversions

Program Description and Purpose

This program is intended to convert the remaining sections of the UGI-ED distribution system operated at 8kV and 4kV to the standard 13.8kV primary system voltage. Areas served by these voltages are remnants of the early build-out of the UGI-ED distribution network. Voltage conversions will eliminate an additional failure point, the need for non-standard equipment (reduce inventory), provide for restoration tie-points and modernize facilities to 13.8kV construction standards.

Background/Justification

UGI-ED operates a single 3-phase 8kV substation and 15, 8kV and 4kV stepdown transformers. Facilities are typically original construction, which means they are now outside current standards and end-of-life. A conversion project involves a pole by pole review to design and construct upgrades as necessary along with a protection coordination study. Facility upgrades may include as necessary, replacement of wire, poles, insulators, transformers and secondary. The goal of each conversion project is to improve reliability by modernizing facilities and reducing restoration times. Conversion projects have been ongoing for several years. With the amount of remaining locations, UGI-ED plans to continue including several distinct projects or phases annually.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Expenditures ($ thousands)	$77(avg)	$125	$125	$150	$150	$150

Locations

Locations are prioritized based on customer impact, load and reliability performance.

Overhead and Underground Service Conductors

Program Description and Purpose

This program addresses the replacement and/or upgrade of residential and small commercial overhead and underground services due to capacity limitations, general condition, location or safety.

Background/Justification

Primary activity within this category involves upgrading customer service conductors to accommodate increased loading. In addition, service conductors, including “open-wire” services, are replaced with modern triplex conductors based on condition and/or relocation to a different service attachment point.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Expenditures ($ thousands)	$180(avg)	$170	$170	$170	$180	$180

Locations

Locations are identified based on customer upgrade requests, service issues and field observations.

Substation Transformers and Distribution Circuit Breaker Replacement Projects

Program Description and Purpose

This program is associated with the replacement of major substation components, primarily 66/13.8 kV distribution transformers and 13.8kV distribution circuit breakers. The facilities identified under this program are at or near end of life, which increases associated maintenance and reliability issues.

Background/Justification

Transformers

UGI-ED has twelve (12) area distribution substations which transform power from the 66kV transmission system to the 13kV distribution system. All UGI-ED load is served from the distribution substations. The substations are configured as either single or double transformer facilities depending on load and tie-line support availability. The distribution transformers must provide the necessary capacity to serve existing and new load under normal and peak conditions. Substations also serve as backups for other substations in the event of transformer outages or peak loading conditions via distribution tie-lines. As a result, the failure of a single distribution substation transformer can have an immediate and large scale impact on customers and limit the ability to guard against other outage contingencies. Therefore, the need for maintaining transformer reliability is of critical importance.

UGI-ED's installed transformer inventory consists of eighteen (18) 66/13.8kV transformers and one (1) 66/13.8kV mobile substation. The average age is 42 years old, with 13 transformers exceeding 40 years. The design life of a typical substation transformer is 40 years. Subject to loading, transformer failure rates typically follow a "bathtub" curve with an elevated percentage occurring early on due to manufacturing and installation issues, a relatively low rate of failures during the normal lifespan and then rapidly increasing failures beyond the design life of the transformer. Transformer failures can result from both internal and external causes. With regular testing and good maintenance practices, it is possible to determine if a transformer is starting to develop certain types of problems. However, not all potential problems can be foreseen and because all transformers are different and undergo varying load cycles, it is impossible to predict if and when a transformer will fail.

Historically, transformer replacements have occurred upon failure or after maintenance activities such as field processing of the transformer oil have failed to improve test results. Going forward with the number of units reaching the end of their design age, transformer replacements will be prioritized based on a combination of age, test results, location with respect to customer load and system support and typical load cycle. Given the magnitude and cost of these projects, UGI-ED is looking to schedule replacements as indicated below.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Planned Installation	0	1	1	1	1	1
Expenditures ($ thousands)	$0	$480	$500	$520	$540	$550

Locations

The transformers are located within UGI-ED's twelve (12) distribution substations. Replacement priority will be based on test results, maintenance issues and age.

Distribution Circuit Breakers

UGI-ED's twelve distribution substations serve customers through 45 distribution circuit breakers and associated transformer bank and bus-tie circuit breakers. UGI-ED's distribution feeders were developed over time, as load increased and additional capacity was required to serve customer load. Current circuit breakers vary in style, manufacturer and age.

Background/Justification

UGI-ED has undertaken a distribution breaker replacement/modernization program aimed at replacing older style circuit breakers that have increased maintenance and reliability issues, while at the same time consolidating circuit breaker inventory. UGI-ED currently has twelve (12) different varieties of distribution circuit breakers in operation. Considering the older style oil circuit breakers and early type vacuum interrupter circuit breakers, the average age of the equipment exceeds 40 years. Lead time for replacement circuit breakers can be 16 weeks or more, and spare components such as vacuum bottles for some older breakers are no longer available, which requires custom manufacturing. As a result, breakers which fail and are switched out can burden the supporting distribution system for the duration of the replacement period, exposing a larger number of customers to potential outages.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Planned Installation	1(avg)	3	3	3	3	3
Expenditures ($ thousands)	$10(avg)	$140	$140	$140	$150	$150

Locations

Priority of circuit breaker replacements will be based on maintenance history, age and location relative to load.

Distribution Relay Replacements

Program Description and Purpose

This program is intended to replace distribution protection relays and associated equipment which are "end-of-life" and experiencing an increased number of failures. The bulk of these relays are first generation microprocessor units utilized as the UGI-ED standard installation for distribution feeder line protection, as well as transformer protection schemes. The balance are older electro-mechanical protection relays which were never upgraded.

Background/Justification

UGI-ED has 34 installations of a common type and manufacturer which were installed starting in the late 1990s and early 2000s. Most relays are microprocessor based, and require no routine maintenance. However, like all electronic devices, the relays are subject to component failure from extended continual use. Of the 34 microprocessor-based relays in-service, four (4) or nearly 12% have completely failed in the last four years. Units will be replaced with new microprocessor based platforms that have some additional functionality, including the ability to interface with other logical devices in the substation.

Scope

Plan Years	2012-2015	2018	2019	2020	2021	2022
Feeder Replacements	0	3	3	3	3	3
Expenditures ($ thousands)	$0	$60	$60	$60	$60	$60

Locations

Locations subject to replacement will be identified by company records and prioritized based on age and customer impact.