Kimberly A. Klock
Assistant General Counsel

PPL
645 Hamilton Street, Suite 700
Allentown, PA 18101
Tel. 610.774.5696 Fax 610.774.4102
KKlock@pplweb.com

E-FILE

April 28, 2026

Matthew Homsher, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

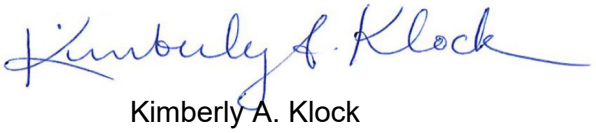
Re: Petition of PPL Electric Utilities Corporation for Approval of a Major Modification to its Existing Long-Term Infrastructure Improvement Plan
Docket No. P-2022-3034972

Dear Secretary Homsher:

Enclosed for filing on behalf of PPL Electric Utilities Corporation ("PPL Electric" or the "Company") please find redlined and clean versions of PPL Electric's Long-Term Infrastructure Improvement Plan, which include a description of the Company's Worst Performing Circuit identification process. These documents are being filed pursuant to Ordering Paragraph 4 in the Opinion and Order entered March 26, 2026 at the above-referenced docket.

Pursuant to 52 Pa. Code § 1.11, the enclosed document is to be deemed filed on April 28, 2026, which is the date it was filed electronically using the Commission's E-Filing System.

Respectfully submitted,



Kimberly A. Klock

Enclosures

cc via email: Darryl Lawrence, Esquire
Allison Kaster, Esquire
NazAarah Sabree

PPL Electric Utilities Corporation

Long-Term Infrastructure Improvement Plan

REDLINED VERSION

PPL Electric Utilities Corporation

Long-Term Infrastructure Improvement Plan

PPL Electric Utilities Corporation

Table of Contents

PPL Electric Utilities Corporation

Introduction

PPL Electric Utilities Corporation ("PPL Electric" or "Company") is submitting this Long Term Infrastructure Improvement Plan ("LTIIP") pursuant to the requirements of Subchapter B, Distribution Systems, of the Public Utility Code, 66 Pa.C.S. §§ 1350-1360, the Public Utility Commission's ("PUC") Implementation Order for Establishment of a Distribution System Improvement Charge, entered on August 2, 2012 at Docket No. M-2012-2293611 and the Commission's regulations at 52 Pa. Code §§ 121.1 et seq. This LTIIP addresses a broad spectrum of Distribution Asset Management initiatives that the Company will use to continue its repair, improvement and replacement of aging infrastructure under this process, and is for the five-year period beginning January 1, 2023, and ending December 31, 2027.

PPL Electric strives to operate as efficiently as possible by performing the work required to maintain system integrity and reliability. Performance indicators such as System Average Interruption Frequency Index ("SAIFI"), Customer Average Interruption Duration Index ("CAIDI") and System Average Interruption Duration Index ("SAIDI") show that PPL Electric's reliability performance is trending downward, primarily due to storm impacts in the territory. The increase in storm events in the past five years in addition to the recent increase in equipment failures due to an aging infrastructure, indicate that PPL Electric needs to increase investment in its distribution system.

PPL Electric has seen a significant increase in storm events in the past five years, with 2025 on track to have the most events in recent history. The impact of these storms has led to increased storm related outages and decreased performance in CAIDI, SAIDI, SAIFI and CEMI. PPL Electric has recently missed the PUC Benchmark for PUC SAIDI and CAIDI, and in 2024 also missed the PUC SAIFI benchmark, all of which were primarily driven by increased storm events. To address the increased storm events, PPL Electric needs to increase efforts to harden its system to protect against weather related outages and improve the experience for its customers.

Addressing aging infrastructure will require ongoing investment. Such investment includes not only replacing aging equipment, but also investment in advanced equipment and communication technologies that can facilitate further system reliability improvements. If continued proactive re-investment does not occur, it is expected that system reliability will degrade, while the overall cost to maintain the distribution system will continue to rise. By investing in its distribution system, PPL Electric will ensure that its system continues to be safe, reliable, and able to meet the growing needs and expectations of its customers.

PPL Electric believes that managing finite resources to produce optimal results is essential for maintaining customer satisfaction. Criteria for program inclusion into the Long-Term Infrastructure Improvement Plan is not whether any single activity produces a positive reliability result, but rather, which portfolio of activities produces the best result for a given expenditure. PPL Electric's goal is focused on results (i.e., the reliability experienced by customers and associated rate impacts); therefore, the LTIIP is strategically designed to help meet those reliability goals.

Reliability Experience

The Distribution Asset Planning process employed by PPL Electric has been focused on maintaining reliability at the level that existed prior to passage of the Electricity Generation Customer Choice and Competition Act ("Customer Choice Act"). Since the 1994-1998 benchmark period, which defines PPL Electric's reliability performance targets, PPL Electric's service reliability has experienced annual swings, positive and negative,

resulting largely from varying weather conditions. Historical benchmark performance is illustrated in Figures 1 and 2.

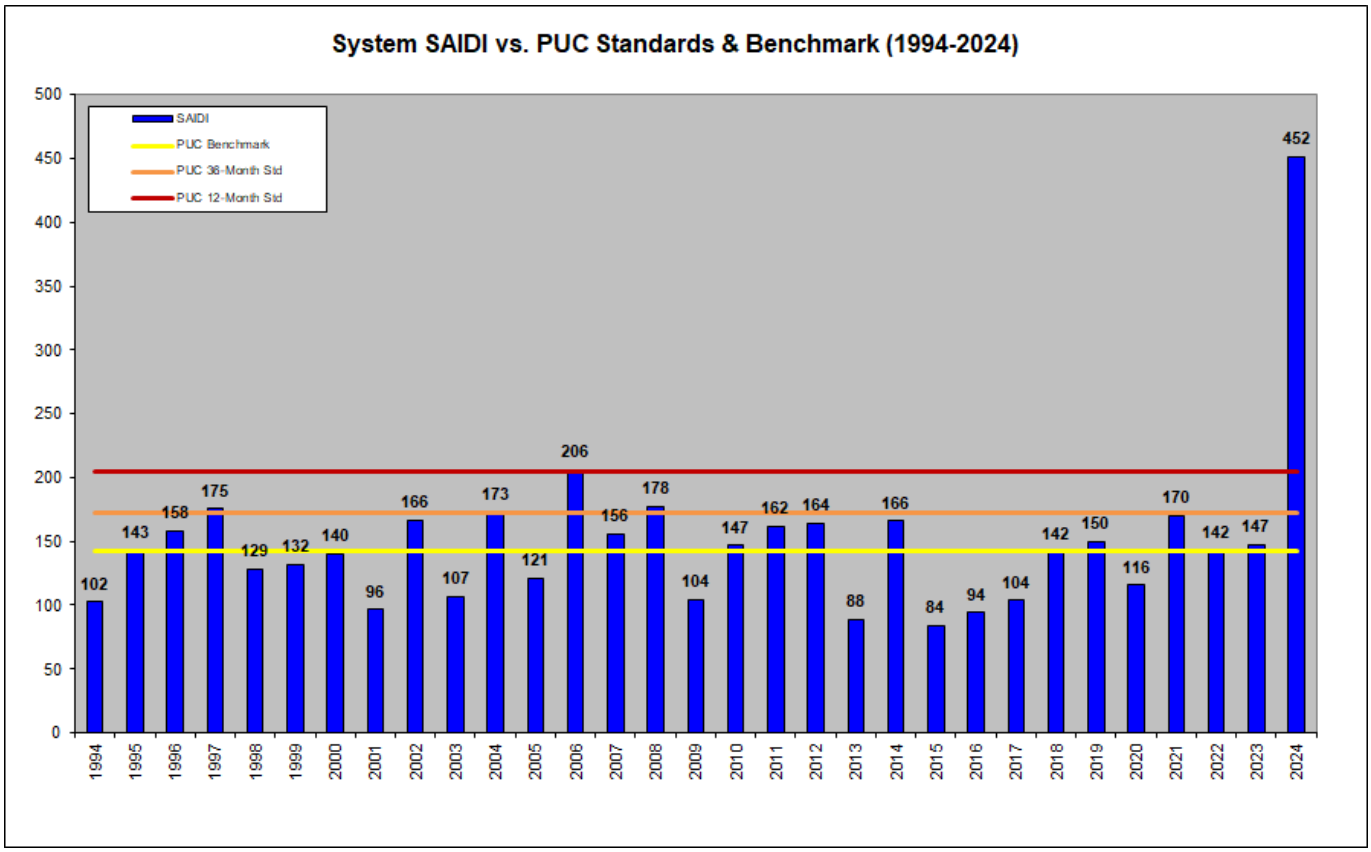


Figure 1: PPL Electric's SAIDI Performance

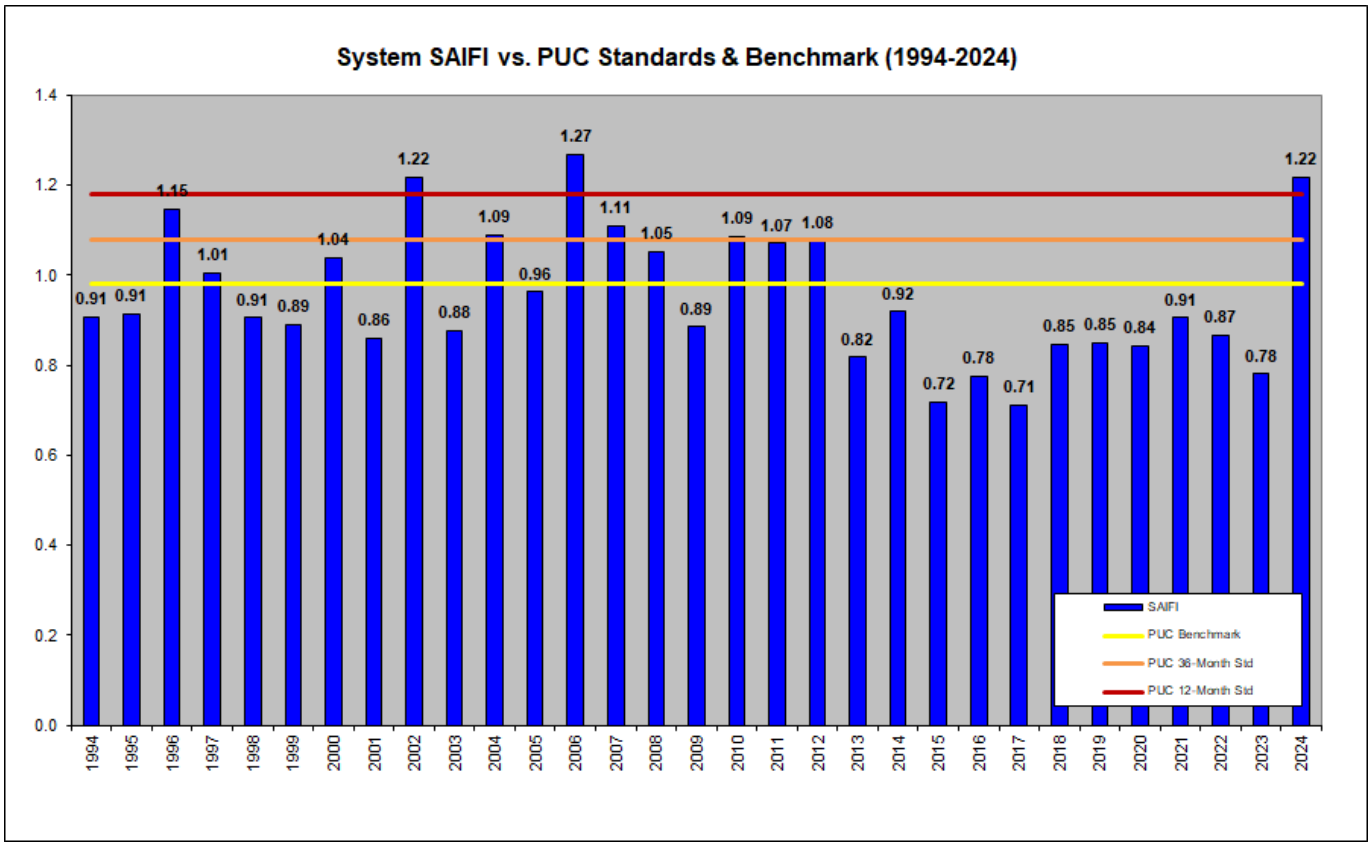


Figure 2: PPL Electric's SAIFI Performance

A significant risk to PPL Electric's ability to meet reliability benchmarks is the large portion of distribution facilities that are now beyond or nearing the end of their design lifetime. See Appendix A for average age of major units of property. The resultant effect on non-storm-related equipment failures is illustrated by the chart in Figure 3 below.

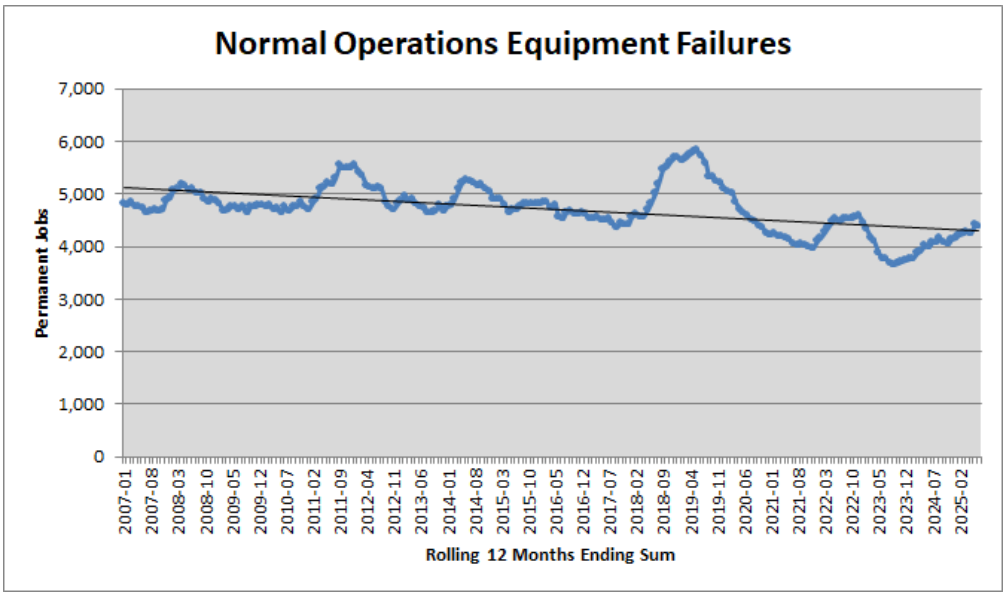


Figure 3: Equipment Failure Service Interruption Cases

The number of no-light cases due to equipment failures is trending slightly upward in recent years, which shows the need to continue investment in replacing aging infrastructure on PPL Electric's system. The need to remediate that equipment which is at or near end-of-life remains to improve this trajectory. Components contributing the most significantly to distribution equipment failures include poles/arms/attachments, overhead and underground conductors, and switches. See Appendix B for further details on asset contribution to reliability metrics.

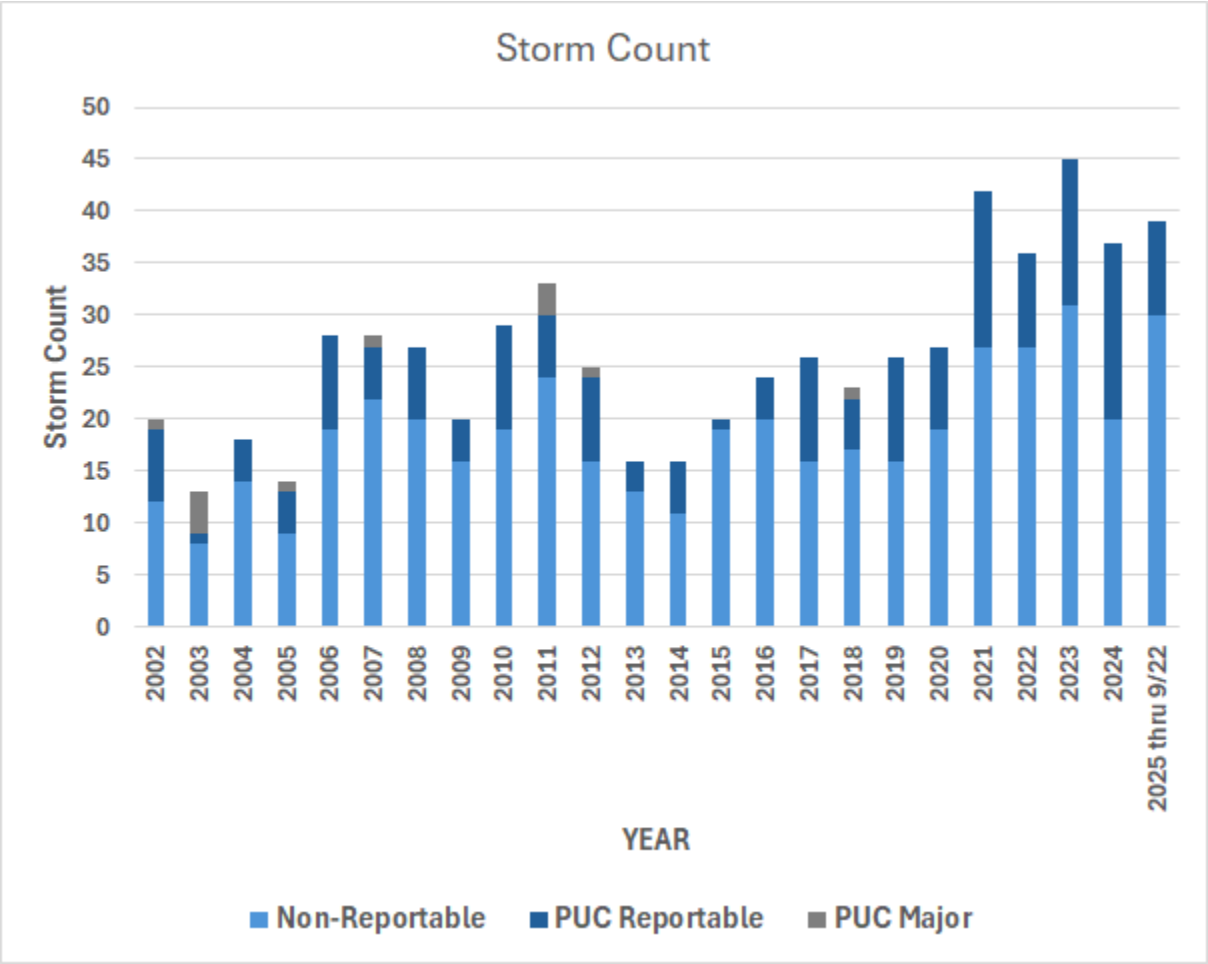


Figure 4: PPL EU Storm Frequency and Count

As shown in the graph above, PPL Electric has experienced increasing storms in the territory, which have resulted in negatively trending reliability. In the recent PUC Management and Operations Audit, it was noted that PPL Electric needed to improve its SAIDI, CAIDI, and CEMI metrics. The primary driver for the poor performance in those reliability metrics was the recent increase in storm frequency and impacts. In 2024, the year after the audit was conducted, PPL Electric experienced its worst reliability year in recent history, with all metrics missing benchmark. Through September 22, 2025, the Company has already seen 39 storm events. In order to improve system reliability, PPL Electric needs to strengthen and harden its system to be more resilient to weather related events.

Response to Increased Storm Events

PPL Electric's circuit hardening efforts look to improve reliability on its worst circuits and sections of circuits that have experienced poor reliability. Such efforts include, but are not limited to:

- Rebuild lines to hardened standards which include stronger poles, covered conductors and other hardened standards.
- Relocate sections of heavily vegetated or inaccessible lines to non-vegetated areas or underground.
- Limit customer exposure on circuits by adding new circuits or substations.
- Build new tie lines to be able to automatically re-energize customers in the event of an outage using the Company's Smart Grid system.

Response to Aging Equipment

PPL Electric's reliability investment process is forward-looking and proactive. It consists of the following:

- Analyze and identify the drivers of historical trends of causes of service outages and other power service problems.
- Forecast future reliability metrics (SAIDI, SAIFI, and CAIDI) given existing mitigation programs' effect on the identified drivers.
- Identify new programs, policies, and activities to enhance or accelerate existing mitigation programs to avoid forecasted gaps between future reliability and benchmark targets.
- Identify, evaluate, and implement new technologies that enhance the Company's condition monitoring strategy.
- Evaluate and adjust existing programs, policies, and activities to produce the desired future results.
- Perform targeted data analytics against the Company's aging infrastructure utilizing real-time, or near real-time, operational data to further improve reliability performance.
- Incorporate the resulting portfolio of existing and new programs, policies, and activities in PPL Electric's five-year business plan.

In February 2018, PPL Electric's Reliability Principles and Practices ("P&P") were revised to help reduce the overall impact to the Company's customers from outages due to various causes, including but not limited to, equipment failures. The P&P sets forth a set of Principles that PPL Electric follows to plan, protect, and operate the Electrical Distribution System ("EDS"). These Principles are implemented through a set of standard Practices that are used as guidelines in designing the EDS. These Practices are reasonable, acceptable, and consistent with leading utility practices. More specifically, to reduce the number of customers experiencing permanent outages and

outage duration over the long term, the following circuit design guidelines are used wherever practical, starting with those identified as Worst Performing Circuits ("WPCs")[1]:

- Provide three-phase line ties that will support the transfer of all but approximately 500-750 customers for 100% of the year.
- Provide sectionalizing devices to limit customer count to no more than approximately 500-750 customers between devices.
- Limit customer count to less than approximately 1,500 customers per circuit.
- Limit line length to approximately 70 circuit miles

Prioritization utilizing these design criteria is based on the greatest expected improvement in reliability for the entire system.

Several other mitigation initiatives have been undertaken to reduce the forecasted short-term equipment failure growth rate.

- **Enhanced Pole Inspection/Treatment Program:** Beginning in 2021, the Company's wood pole inspection and treatment program was enhanced from a subjective inspection process to an objective, resistance drill-based methodology. The resistance drill inspection allows a complete pole health assessment, with both interior and exterior decay accurately measured. This holistic strength assessment of the pole is the most accurate and thorough pole inspection possible. As an integral part of the twelve-year pole inspection process, PPL Electric observes, notes, and reports at-risk conditions of all pole attachments, specifically crossarms, braces, conductors, transformers, fuse cutouts, lightning arresters, reclosers, regulators, capacitors, switches, wildlife protection, vegetation encroachment, guys, anchors, ground wires, and ground rods.
- **Increased Utilization of Infrared Inspections:** PPL Electric conducted a trial of infrared inspections of multi-phase lines in 2006. The trial inspections cost $122,500 and identified repairs costing $100,000, saving an estimated 1,460,000-2,600,000 Customer Minutes Interrupted ("CMI"). Funding of infrared inspections and repairs was increased significantly during 2010 and has remained at a higher funding level. Infrared inspections occur on all 3-phase and 2-phase overhead lines adjacent to roadways every two years.
- **Proactive Circuit Analysis ("PCA"):** PCAs are performed on each circuit on a four-year cycle. The review analyzes and addresses both operational and reliability characteristics of each circuit. Voltage support, phase balancing, protection coordination, power factor maintenance and loading issues are addressed from an operational perspective. Service outage analysis, exposure analysis, and field checks address reliability and power quality.
- **Distribution Automation Strategy:** In 2010, PPL Electric launched a "smart grid" pilot project that enables the Company to react rapidly to changes on the delivery system, and to automatically re-route power around problems that occur. The project initially focused on the Harrisburg, Pa. area, but has since been expanded to cover all of the

[1] PPL Electric uses a weighted circuit SAIDI and circuit SAIFI contribution over the previous three years to define the WPCs on its system. IEEE Major Event days, transmission outages, and scheduled outages are excluded. This ranking system was put in place as of the first quarter of 2025.

Company's service territory. The project included the implementation of an advanced Distribution Management Systems ("DMS"), which was a breakthrough technology that enables the Company's operators to see the status of PPL Electric's distribution network in real-time. In 2016, PPL Electric completed a system wide rollout of Fault Isolation and Service Restoration ("FISR") technology. FISR identifies faulted sections and quickly develops an optimized restoration plan, then automatically executes that plan. Customers typically can be restored within five minutes from the start of the outage. This milestone is an industry first and has saved over three million customer interruptions since the start of the program through June of 2025. Over 8,600 automated smart devices have been installed, which has allowed for remote operation and monitoring of circuit sectionalizing equipment.

Although these programs have successfully slowed failure growth rates in the short-term, PPL Electric faces a long-term issue regarding aging infrastructure. The surge in electrical construction in the 1960's and 1970's has resulted in a large number of assets that have reached or are nearing the end of their useful lifetime. Consequently, in 2008-2009, PPL Electric conducted a major condition assessment and maintenance study of its distribution system. The result was the implementation of the Asset Optimization Strategy ("AOS"). The study found that programmatic and accelerated replacement of infrastructure would be the most cost-effective strategy to address aging infrastructure and ensure system reliability and integrity.

Asset Optimization Strategy

The purpose of the AOS study was to develop a strategy for accelerated capital replacement improvements that would combat the anticipated effects of aging infrastructure and bolster PPL Electric's ability to effectively maintain reliable electric service. With the Company entering a period where a significant number of assets are expected to reach the end of life, a plan was developed to intelligently replace assets prior to an unplanned failure that impacts customers. The plan includes replacements in kind, as well as upgrades to current standards.

Examples of AOS Projects include proactive replacement of substation equipment, Low Tension Network ("LTN") equipment, and vintage underground cable based on condition-based health analysis.

Accelerated Investment

As a result of the AOS study, PPL Electric approximately doubled its planned level of investment in DSIC-eligible property from 2009-2012. During this period, non-storm equipment failures fluctuated but continued to show a slight upward trend. PPL Electric continued to accelerate planned capital investments during the periods 2013-2017 and 2018-2022 to address an upward trend in equipment failures that peaked in 2018-2019 (see figure 3 above).

Period	Avg Annual Capital investment (in millions)
2008-2012	$88
2013-2017	$137
2018-2022	$180

Figure 5: Approximate average annual capital investment in millions. Not adjusted for inflation.

As a result of these investments, PPL Electric arrested the increase in failed equipment; however, in recent years the trend of failures has begun to increase again. Even with these investments, the average age of equipment increased slightly since the 2018-2022 plan.

Implementation of Long-Term Infrastructure Improvement Plan

The Long-Term Infrastructure Improvement Plan, in addition to various other prudent capital investments, helps to ensure the safety and reliability of the distribution system. The investments since the LTIIP was initially put into place had arrested and reversed the growth trend in equipment failures, however, as noted above the trend has started to increase in recent years. Equipment failure trends and asset-specific contributions to system-level reliability metrics are analyzed on an ongoing basis to ensure funding is invested appropriately.

PPL Electric routinely reviews the effectiveness of programs to ensure cost-effective investment. Program/project impact on SAIDI and SAIFI, in addition to potential reductions in outage response costs, is compared to the overall program/project costs. PPL Electric utilizes a project prioritization process that defines the cost-effectiveness of programs/projects to ensure effective optimization of reliability investments. PPL Electric currently is improving the use of ongoing asset health indices to further refine asset replacement criteria.

Ongoing review of the effectiveness of investments to address equipment failure trends will likely result in adjustments to the strategy over time. Future Long Term Infrastructure Improvement Plans will reflect such adjustments. Additionally, work plans may fluctuate throughout a given year due to the need to reallocate resources in response to changing business needs. Some examples include shifting resources for storm response activities, project construction delays caused by a backlog of material deliveries, and the redirection of investment to cure costly equipment failures. In addition, during the project engineering phase, issues such as right-of-way requirements and environmental considerations can result in scope changes that also can delay actual construction. During construction of larger projects, additional scope needs can be identified, creating the need to defer other projects. Finally, reliability metric performance can result in redirection of spending to help ensure the ability to meet targets.

Projected expenditures for the replacement of failed equipment are based on a review of historical trends while considering current failure rates and proactive mitigating measures. For such programs, it is difficult to project the specific scope and location. Therefore, PPL Electric has provided only planned expenditures based on historical trending information.

Utility Outreach

PPL Electric continues to remain engaged, seeking out opportunities with other utilities and government officials on the planning and execution of future construction projects. A forum exists with the Utility Highway Liaison Committee ("UHLC"), with whom PennDOT, the Turnpike Commission, other utilities, and the Energy Association of Pennsylvania meet quarterly to discuss policy issues, present and future projects, and relocation projects. The Company is a regular participant. Initiatives at these forums are focused primarily on improving state and utility interactions.

PPL Electric also participates in various Pennsylvania Coordinating Committees, including the Northeast PA ("NEPA") Regional partnership, the Lancaster County Regional Partnership, the Lehigh Valley Regional Partnership, and the Lycoming County Area Coordinating Committee. These meetings are held monthly, bi-monthly, or quarterly to discuss and share project plans with stakeholders including utility companies, PennDOT, public works officials and planning commission members.

Utilization of a Qualified Work Force

PPL Electric Workforce

As a measure to ensure the use of a qualified workforce, PPL Electric has adopted the definition of a Qualified Electrical Worker from the Occupational Safety and Health Administration ("OSHA") Regulation 29 CFR § 1910.269 Electrical Power Generation, Transmission and Distribution, which is defined in the PPL Electric Safety Rule Book and is provided to each employee. It is also incorporated into the training and qualification process for all electrical workers.

PPL Electric administers a rigorous, formal training and evaluation process for all qualified electrical workers. Training is required before an employee may perform work independently on exposed, energized electrical equipment greater than 50 volts. Training requirements and programs are unique to the job classification and work being performed. Curriculum documents, outlining subject areas and training durations by job classification have been developed. Training may require up to 5 years to complete and incremental qualifications, following assessment, are identified throughout the duration of the training program. Retraining is conducted on a periodic basis as required by OSHA or more frequently when determined necessary.

PPL Electric Utilities Corporation

PPL Electric's formal training programs are administered by the Technical Training & Development group. The training section of the group is comprised of both training professionals and craft employees. Experienced training professionals lead the design and development of the training programs with input from subject matter expertise provided by craft employees from the field. Training program (curriculum) content is approved by a curriculum committee which is comprised of business line managers. The basic job requirement for an instructor includes 5-years of experience performing the work and attainment of Journeyman level (or equivalent) qualifications. Craft instructors are then trained and mentored. Training delivery is governed by PPL Electric policies and procedures to ensure quality and consistency.

Training is delivered in phases. A phase typically consists of a grouping of training modules into one training period of several days to several weeks. Training consists of both classroom and field work to gain hands-on practical learning experience. Trainees are evaluated throughout the program. Evaluation includes written examination and/or a performance examination. Employees must successfully complete each training module before progressing to the next phase of training.

In addition, trainees in key programs must complete an additional skills assessment prior to advancement to the next step. These assessments are coordinated by the TD&I group. The employees are evaluated (graded) by a panel comprised of knowledgeable field supervisors and experienced bargaining unit craft members. This independent evaluation serves as a quality control check on the TD&I training section.

Over the next 5 years, PPL Electric will be executing a resource strategy which includes formal training classes to hire and train new employees in preparation for upcoming attrition.

Contractor Workforce

PPL Electric's Sourcing department administers a standard process for soliciting contractors to perform work identified to be completed by independent contractors. The process includes issuance of a Request for Proposal ("RFP") to various contractors. That process includes a meeting to review the technical and administrative components of the work and normally a walk-down of the project area. Responses to the RFP are evaluated based on detailed financial and technical schedules that compare respondents' capabilities. Part of the RFP evaluation process includes evaluating the qualification of contractors to perform work (both technical and financial capabilities to meet the contractual commitments, and level of qualification of employees) and may include reference checks if appropriate. Any specific required qualifications of contractors would typically be outlined in the RFP and/or contract (for example: pole installation, permit and tag authorities, line construction by specific voltage, live line work, foundations, directional bore/trenching, underground networks).

Most independent contractors employ personnel through the building trades, which includes Union apprenticeship programs to help ensure that employees are qualified to perform assigned work. (This approach is comparable to PPL Electric's Union labor qualification training program.) Employee qualification programs for non-Union independent contractors are stringently reviewed to assess the contractor's training program, such as on-the-job training and certification programs.

Prior to award, contractors are screened for their safety performance and, if applicable, environmental record. Contractors that do not have an acceptable record receive no further consideration. In the event that a contractor working for PPL Electric incurs safety incidents and/or does not take appropriate safety measures, the contractor is terminated and prohibited from performing work for PPL Electric in the future.

PPL Electric Utilities Corporation

PPL Electric has instituted a contractor orientation program that provides new contractors an opportunity to understand company expectations for performing work safely, mindful of public and private landowner considerations and administrative concerns (such as billing). PPL Electric also performs weekly safety and workmanship review meetings with the Company's contractor work force to review safety issues and other relevant topics

PPL Electric sponsors a training program that allows the contractors' employees to become qualified in PPL Electric's permit-and-tag system. Contractor employees who successfully complete the training program can be permit holders on PPL Electric's system.

PPL Electric monitors the contractors' performance through several activities that may include direct job oversight through on-site supervision, monthly scorecards that evaluate such areas as job quality, safety performance, cost, and validating billing activities that meet contractual expectations. If safety concerns are identified at a job site, any person has the ability and express duty to cease work until the concerns have been appropriately addressed, and a safety review team could be assembled to formally request a contractor to respond to safety concern. Safety violations could result in immediate contractor termination.

PPL Electric's Project Construction Supervisors continuously monitor the quality of all contractor work and adherence to PPL Electric's Construction Standards. Where the contractor installs specialized equipment on critical facilities, special Quality Assurance review are performed which may include inspection of grounding, trench, foundations, final grade, structural components, poles/towers, conduits, electrical equipment, primary conductor, wiring, designations, and final completion of the Acceptance of Facilities form). Any failures are described along with description and dates of corrections to resolve the areas of concern before final acceptance of the contractor's quality of work.

PPL Electric Utilities Corporation

Summary

As a result of the economic expansion and building boom of the 1960's and 1970's, much of PPL Electric's distribution system was originally constructed 50 or more years ago. As this equipment deteriorates due to age, environmental exposure, and added load, it becomes increasingly critical to plan for the repair, upgrade, and/or replacement of these assets through the initiatives described above. In the absence of these initiatives, the efficiency, safety, and reliability of the electric distribution system is expected to be increasingly compromised. PPL Electric believes that the expenditures for these initiatives constitute a prudent and reasonable investment for managing its distribution assets and that each of the listed programs will successfully achieve one or more of the following benefits:

- Maintaining public and employee safety
- Reducing service outage durations and number of customers affected
- Reducing service outage restoration times
- Reducing service outage locating and repair times
- Controlling service outage repair costs
- Limiting failure-related damages and related costs, and
- Improving/maintaining power quality (voltage, flicker, etc.)

To achieve these results, PPL Electric anticipates the need for the following total capital expenditures with corresponding quantities of units/projects over the 2023-2027 period. Note that planned expenditures for certain initiatives can fluctuate yearly due to the various factors identified previously.

	Millions of dollars invested					
	2023	2024	2025	2026	2027	Total
Poles	$ 11.40	$ 12.58	$ 29.07	$ 21.94	$ 21.94	$ 96.93
New Electronic Reclosers	$ 2.10	$ 3.62	$ 8.28	$ 6.50	$ 8.98	$ 29.48
Distribution Animal Guarding	$ 0.20	$ 0.63	$ 0.20	$ 0.30	$ 0.27	$ 1.60
Failed Equipment	$ 42.85	$ 55.59	$ 44.14	$ 38.17	$ 35.15	$ 215.90
Underground Cable Replacement and Life Extension	$ 0.52	$ 0.39	$ 5.72	$ 3.20	$ 3.07	$ 12.90
Low Tension Network Primary Cable, Equipment and Structures	$ 0.54	$ 1.58	$ 1.86	$ 5.33	$ 3.50	$ 12.81
Substation	$ 11.25	$ 16.38	$ 32.46	$ 42.56	$ 58.80	$ 161.46
LTN Upgrades	$ 6.87	$ 4.90	$ 4.33	$ 7.44	$ 5.91	$ 29.45
Reliability	$ 9.19	$ 15.62	$ 11.31	$ 11.55	$ 10.37	$ 58.04
System Reliability Improvement Projects	$ 19.23	$ 21.11	$ 23.05	$ 314.53	$ 300.85	$ 678.77
Unreimbursed Highway Relocations	$ 8.87	$ 10.12	$ 4.74	$ 4.26	$ 4.71	$ 32.69
Protection and Control	$ 3.34	$ 7.58	$ 37.36	$ 13.16	$ 5.73	$ 67.17
Total	$ 116.36	$ 150.10	$ 202.51	$ 468.93	$ 459.29	$ 1,397.20

Category	2023	2024	2025	2026	2027
Poles	2,131	2,345	3,800-4,900	2,300-2,900	2,300-2,900
New Electronic Reclosers	182	72	249-275	155-171	231-255
Distribution Animal Guarding	56	362	240-360	240-360	240-360
Failed Equipment	*Scope and locations determined as equipment fails*				
Underground Cable Replacement	0	66	350-400	200-300	200-300
Low Tension Network Primary Cable, Equipment and Structures	2	3	10-25	80-105	30-44
Substation	64	50	146-221	155-201	144-191
LTN Upgrades	29	37	164-184	185-214	8-12
Reliability	58	226	341-376	20-35	20-35
System Reliability Improvement Projects	5	7	17-22	310-370	255-305
Unreimbursed Highway Relocations	*Scope and locations determined as requested*				
Protection and Control	19	130	170-200	145-160	20-30

Almost all of the aforementioned initiatives take advantage of new technologies that did not exist when the associated assets were originally placed into service, and many of these technologies are very recent innovations. These technologies are expected not only to restore the assets to their original level of performance, but, in many cases, provide performance well beyond what previously was achievable in order to ensure and maintain adequate, efficient, safe, and reliable service.

Some of the initiatives clearly have implied endpoints, where no further opportunities for improvement remain. Others eventually experience diminishing returns over time. Other initiatives, such as pole reinforcement and replacement, will be ongoing. Finally, some programs may become obsolete, while new programs may become desirable as a result of the evolution of new technologies. Because of these and other variables, the effectiveness of these programs is reviewed annually, and programs are added, deleted, and/or modified, as necessary, to ensure that the expenditures are providing the desired benefits to customers at a reasonable cost.

Distribution Assets

The following pages detail 5-years projections for Long-Term Infrastructure Improvements initiatives that apply to distribution line assets. These assets include, but are not limited to, the following:

- Structures
    - Poles
    - Crossarms
    - Vaults
    - Manholes
- Overhead Conductors and Hardware
- Underground Cables and Hardware
- Switching Devices
    - Air Break Switches
    - Disconnect Switches
    - Switching Cabinets

- Protective Devices
  - Fuses
  - Reclosers
  - Network Protectors
  - Lightning Arresters
- Transformers
  - Overhead
  - Pad-Mounted
  - Submersible
  - Low Tension Network

Poles

This category includes the replacement and reinforcement of wood poles to maintain reliability, ensure public safety, and further storm harden the system.

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$11.4	$12.58	$29.07	$21.94	$21.94	$96.93

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Distribution Pole Replacements

Program Description and Purpose

Replacement of distribution wood poles identified as non-restorable (cannot be reinforced) during the annual inspect and treat program or during a spot inspection in an effort to improve public and employee safety. This program contributes to storm hardening efforts and aims to improve public and employee safety, as well as service reliability, by reducing potential pole failures.

Identification/Justification Process

PPL Electric inspects approximately 75,000 poles per year. Historical data suggests an approximate 5% rejection rate from the population of yearly inspections. Of those poles rejected, 80% are candidates for replacement. Replacing rejected poles avoids property damage and risk of accidental injury, and it mitigates the costs associated with extended service outages.

Scope

The scope of the program is a direct correlation to the number of wood pole inspections.

Actual, Forecast, and Planned Replacements in Units					
2023-Actual	**2024-Actual**	**2025-Forecast***	**2026-Planned**	**2027-Planned**	**Total Scope**
1,420	1,171	3,500-4,500	2,000-2,500	2,000-2,500	10,091-12,091

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations

Specific locations are a direct correlation to the wood pole inspection plan. Inspection locations are identified yearly primarily as a function of previous inspection dates, as well as ensuring cost-effectiveness of the program and minimizing inspection crew movements.

Pole Reinforcements

Program Description and Purpose

Reinforcement of deteriorated distribution wood poles in order to restore the pole's original strength, ensure public safety, and maintain reliable electric service through the reduction of potential pole failures. This program contributes to storm hardening efforts by reducing potential pole failures.

Identification/Justification Process

PPL Electric inspects approximately 75,000 poles per year. Historical data suggests an approximate 5% rejection rate from the population of yearly inspections. Of those poles rejected, 20% are candidates for reinforcement. When applicable, this method achieves a significant savings over pole replacement. The proportion of failed inspections that result in replacements rather than reinforcements has increased for grid resiliency improvement efforts. Higher class poles have become more favorable, thus lowering the threshold for lower class poles to be deemed non-restorable.

Scope

Actual, Forecast, and Planned Reinforcements in Units					
2023-Actual	**2024-Actual**	**2025-Forecast ***	**2026-Planned**	**2027-Planned**	**Total Scope**
711	1,174	300-400	300-400	300-400	2,785-3,085

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations

Locations identified for reinforcement are a direct correlation to the number of wood pole inspections.

New Electronic Reclosers

Program Description and Purpose

Proactive installation of new electronic reclosers on both single-phase and three-phase lines, to improve reliability performance by increasing circuit sectionalizing ability. Reclosers minimize the number of customers affected by a sustained outage.

Identification/Justification Process

Locations are requested by regional reliability engineers and prioritized annually based on anticipated reliability savings.

Scope

Actual, Forecast, and Planned Installations in Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
182	72	249-275	155-171	231-255	889-955

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	152-160
Northeast	162-170
Central	152-165
Susquehanna	141-150
Harrisburg	141-160
Lancaster	141-150

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast ***	**2026 Planned**	**2027 Planned**	**Total**
$2.10	$3.62	$8.28	$6.50	$8.98	$29.48

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Distribution Animal Guarding

Program Description and Purpose

Proactive installation of animal guards on existing distribution overhead transformers and air break switches to improve circuit reliability. Animal guards help prevent animal-related contacts which cause service interruptions.

Identification/Justification Process

Transformers are identified both by opportunistic installation of guarding during other non-related work, and by on-the-spot or follow-up orders after responding to animal-caused outages.

Scope

Actual, Forecast, and Planned Installations					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
56	362	240-360	240-360	240-360	1,138-1,498

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	190-250
Northeast	190-250
Central	190-250
Susquehanna	190-250
Harrisburg	189-249
Lancaster	189-249

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast ***	**2026 Planned**	**2027- Planned**	**Total**
$0.20	$0.63	$0.20	$0.30	$0.27	$1.60

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Failed Equipment

This category includes the replacement of failed or deteriorated distribution equipment, LTN equipment, underground cable, and underground getaways.

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$42.85	$55.59	$44.14	$38.17	$35.15	$215.90

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Distribution Failed Equipment

Program Description and Purpose

Replacement or repair of failed or deteriorated capital units of distribution equipment, excluding underground cable, in order to maintain adequate service reliability.

Identification/Justification Process

Candidates are identified via inspections, both planned and ad-hoc, as well as actual outages and power service problems. Budget allocations are based on historical trends of hours charged to corrective work, in addition to projected trends of future equipment failures. Examples include, but are not limited to, failed reclosers, poles, capacitor banks, and air breaks.

Scope & Locations

Scope and locations are determined as equipment fails.

Replace Failed Underground Cable

Program Description and Purpose

Replacement of failed underground residential primary and secondary cables in order to maintain adequate service reliability.

Identification/Justification Process

Candidates are identified via actual failures. Budget recommendations are based on historical trends of hours charged to corrective work, in addition to projected trends of future equipment failures.

Scope & Locations

Scope and locations are determined as cable fails.

Replace Failed 12 kV Underground Getaway Cables

Program Description and Purpose

Replacement of failed 12 kV underground getaway cables to maintain adequate service reliability. Getaway failures can result in long duration outages. Getaway cables connect substations to outgoing feeders beyond the substation perimeter.

Identification/Justification Process

Candidates are identified via actual failures and cables with poor test results. Budget recommendations are based on historical trends in getaway failure quantities and costs, in addition to projected trends of future getaway failures based on asset health metrics.

Scope & Locations

Scope and locations are determined as getaway cables fail while in service or fail conditionally under testing.

Replace Deteriorated/Failed Low Tension Network Equipment and Structures

Program Description and Purpose

Replacement or repair of deteriorated and failed equipment related to Low-Tension Networks, including network transformers, network protectors, manholes, and vault tops in order to maintain adequate service reliability. Low-Tension Networks are low voltage underground distribution facilities found in urban areas.

Identification/Justification Process

Candidates are identified via actual failures, inspections, testing, or work on the system. Budget recommendations are based on historical trends of corrective work, in addition to projected trends of future equipment failures.

Scope & Locations

Scope and locations are determined as assets fail.

Replace Deteriorated/Failed Area Supply Substation Equipment

Program Description and Purpose

Replacement of failed or deteriorated station facilities at area supply substations with in-kind equipment to maintain safe and reliable service. Identified facilities include, but are not limited to, circuit breakers, power transformers, tie/transfer cables, disconnect switches, DC equipment, and instrument transformers.

Identification/Justification Process

Candidates are identified via actual failures, inspections, and test results. Budget recommendations are based on historical trends in equipment failure quantities and costs, in addition to projected trends of future equipment failures based on asset health metrics.

Scope & Locations

Scope and locations are determined as station equipment fail while in service or fail conditionally under testing.

Underground Cable Replacement

Program Description and Purpose

Programmatic replacement of deteriorated underground cable to maintain reliable electric service.

Identification/Justification Process

Candidates are selected based on history of cable failures and failure risk scores generated by a data analytics model that uses criteria such as segment length, cable age, customer count, and number of tap fuse outages.

Regional allocation of cable remediation is based on historical regional percent contribution to system-wide cable failures.

Scope

Actual, Forecast, and Planned Scope in Cable Segments					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
0	66	350-440	200-300	200-300	816-1,106

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	561-650
Northeast	25-56
Central	55-90
Susquehanna	55-90
Harrisburg	90-140
Lancaster	30-80

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$0.52	$0.39	$5.72	$3.20	$3.07	$12.90

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Low Tension Network Primary Cable, Equipment and Structures

Program Description and Purpose

Programmatic replacement of deteriorated equipment related to Low Tension Networks, including primary underground cable, network transformers, network protectors, manholes, and vault tops. The purpose of this program is to ensure public safety and service reliability through the replacement of underground

facilities that have reached the end of their expected life or that show signs of premature age from prolonged exposure to corrosive environments.

Identification/Justification Process

Primary underground cables for Low Tension Network feeders are reaching their end of useful life and proactive replacements mitigate feeder outages. Replacement and repairs of manhole and vault tops are determined by regular inspections. Network transformer and network protector replacements are determined through inspection and age, where assets exceeding 40 years in service are considered highest priority.

Scope

Actual, Forecast and Planned Replacements in Units (in Work Orders)						
	2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
Primary Cable Replacements	1	2	0-2	0-3	0-4	3-12
LTN Equipment	1	1	10-25	80-105	30-40	122-172

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	LTN Equipment	Cable
Lehigh	12-17	2
Northeast	28-40	0-2
Central	22-31	1-2
Susquehanna	3-5	0-2
Harrisburg	31-43	0-2
Lancaster	26-36	0-2

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$0.54	$1.58	$1.86	$5.33	$3.50	$12.81

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Substation

This category includes replacement of various substation assets and substation animal guarding.

Substation assets include, but are not limited to, the following:

- Structures
  - Enclosures
  - Fences
- Overhead Conductors and Hardware
- Underground Cables and Hardware
- Switching Devices
  - Air Break Switches
  - Disconnect Switches
- Protective Devices
  - Circuit Breakers
  - Fuses
  - Reclosers
  - Lightning Arresters
- Transformers
  - Power
  - Station Service
  - Instrument

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$11.25	$16.38	$32.46	$42.56	$58.80	$161.45

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Underground Getaway Cable Replacements and Life Extension

Program Description and Purpose

Proactive replacement of aging and deteriorating 12 kV underground getaway cables to prevent failures that can result in long duration outages.

Identification/Justification Process

Getaways are selected for proactive replacement based on data analytics risk models that quantify cable health and risk and provide a priority ranking based on risk factors such as age, repair history, installation type, length, load transferability, etc. Scope is additionally identified through inspection feedback and other work.

Scope

Actual, Forecast, and Planned Replacements in Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
5	3	15-20	24-29	30-36	77-93

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	19-22
Northeast	18-21
Central	7-9
Susquehanna	7-9
Harrisburg	17-20
Lancaster	9-12

Miscellaneous Substation Equipment

Program Description and Purpose

Programmatic replacement of older substation equipment, including air break switches, potential transformers ("PTs"), capacitance-coupled voltage transformers ("CCVTs"), circuit switchers, lightning arresters, voltage regulators, and DC panels in order to prevent future maintenance concerns and to maintain reliable service.

Identification/Justification Process

Candidates for replacement are identified based on age and/or operating condition, both indicators of potential failure. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
2	1	20-50	18-20	18-20	59-93

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	9-14
Northeast	12-17
Central	7-13
Susquehanna	9-14
Harrisburg	12-19
Lancaster	10-16

Distribution Substation Circuit Breakers

Program Description and Purpose

Proactive replacement of substation circuit breakers ("CBs") based on asset health and risk factors produced by data analytics models to maintain reliable service. This program includes the replacement of 12 kV circuit breakers.

Identification/Justification Process

Candidates for replacement are identified based on data analytics risk models that consider age, mis-operation history, repair history, obsoletion, and load transferability. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window. Furthermore, assets with chronic issues and high O&M trails are also factored into the proactive replacement scope.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
43	37	60-80	65-85	50-70	255-315

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	65-75
Northeast	35-45
Central	45-55
Susquehanna	32-42
Harrisburg	29-39
Lancaster	49-59

69/12 kV & 138/12 kV Transformer Replacement

Program Description and Purpose

Proactive replacement of distribution substation transformers based on asset health and risk factors produced by data analytics models to maintain reliable service. This program includes the replacement of 69/12 kV and 138/12 kV transformers.

Identification/Justification Process

Candidates for replacement are identified based on data analytics risk models that consider age, dissolved gas analysis trends/analytics, repair history, obsoletion, and load transferability. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window. Furthermore, assets with chronic issues and high O&M trails are also factored into the proactive replacement scope.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
4	5	4-8	6-10	6-10	25-37

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	6-9
Northeast	5-6
Central	5-7
Susquehanna	3-5
Harrisburg	1-2
Lancaster	5-8

Distribution Substation DC Equipment

Program Description and Purpose

Programmatic replacement of distribution substation DC equipment based on asset health and risk factors produced by data analytics models to maintain reliable service. This program includes the replacement of 24 V, 48 V, and 125 V batteries, chargers, and related equipment.

Identification/Justification Process

Candidates for replacement are identified based on age, operating issues, availability of spare parts, and failure trends. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window. Furthermore, DC assets with chronic issues and high O&M trails are also factored into the proactive replacement scope.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
3	2	30-35	30-35	30-35	95-110

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	26-29
Northeast	18-21
Central	15-18
Susquehanna	13-15
Harrisburg	13-15
Lancaster	10-12

Substation Animal Guarding

Program Description and Purpose

Improvements to existing distribution substation equipment via the proactive installation of animal guards to prevent animal contacts and maintain reliable service. Guarded equipment includes transformer bushings, circuit breakers, fuse/disconnect switches, bus supporting insulators, surge arresters, station service transformers, PTs, and cable terminations. Future investments could be made in pilot products like internal perimeter electric fences for comprehensive rodent deterrents at high animal contact risk locations.

Identification/Justification Process

Distribution substations are regionally prioritized based on historical animal-related service outages (both at the substation and within a 1-mile perimeter), number of customers served, substation load, and transferability. High priority substations are animal guarded first with the lower priority substations guarded in outer years.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
3	1	9-15	5-10	5-10	23-39

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	9-11
Northeast	1-5
Central	2-5
Susquehanna	3-5
Harrisburg	6-8
Lancaster	2-5

12 kV Underground Bus Tie & Transfer Cable Replacement

Program Description and Purpose

Proactive replacement of distribution substation underground bus tie and transfer cables based on asset health and risk factors produced by data analytics models to maintain reliable service. This program includes the replacement of all 12 kV underground cables within the perimeter of the substation yard.

Identification/Justification Process

Underground bus tie and transfer cables are selected for proactive replacement based on data analytics risk models that quantify cable health and risk, and provide a priority ranking based on factors such as age, repair history, installation type, length, loading, etc. Scope is additionally identified through inspection feedback and other work.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
4	1	8-13	7-12	5-10	25-40

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	5-8
Northeast	2-5
Central	7-9
Susquehanna	2-4
Harrisburg	7-9
Lancaster	2-5

LTN Upgrades

Program Description and Purpose

The purpose of this program is to install remote monitoring and control equipment in all Low Tension Network ("LTN") vaults, upgrade network devices up to the latest standard, replace vault equipment near its end of useful life, and install telemetry on secondary network cable. These improvements will allow for safer operation of LTNs, reduce maintenance costs, reduce failed equipment requiring replacement, and provide better data for asset planning and investments.

Identification/Justification Process

Rollout of this program began in the Lehigh and Harrisburg regions. By the completion of this program in 2027, all LTN vaults will receive automation.

Scope

Actual, Forecast, and Planned Replacements in Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
29	37	164-184	185-214	8-12	423-476

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	60
Northeast	107
Central	76
Susquehanna	31
Harrisburg	84
Lancaster	92

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$6.87	$4.90	$4.33	$7.44	$5.91	$29.45

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Reliability

This category includes deployment of Smart Grid devices and distribution circuit upgrades to address reliability issues identified through inspections or various circuit or customer level performance metrics.

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$9.19	$15.62	$11.31	$11.55	$10.37	$58.04

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Distribution Reliability Preservation

Program Description and Purpose

Upgrades to the distribution system as justified by regional reliability supervisors to improve reliability. Improvements are targeted towards WPCs, circuits with a history of customer complaints, or recommendations as a result of PCAs. PCAs are detailed reliability and operational analysis performed on 25% of a region's distribution circuits per year. Additional work is scoped on the basis of Customers Experiencing Multiple Interruptions ("CEMI"), and Customers Experiencing Multiple Momentary Interruptions ("CEMMI").

Identification/Justification Process

Projects are identified and submitted for both small and large-scale circuit improvement. These projects are ranked utilizing PPL Electric's investment prioritization tool to ensure funds are directed towards the most cost-effective projects. The number of projects and locations may vary depending on areas with reliability concerns. Examples include, but are not limited to, installation of fuses, fault indicators, reconductoring of vintage conductor, upgrading conductor to reduce impact of vegetation related service outages, and relocating sections of lines that may be inaccessible or prone to vegetation related service outages.

It should be noted projects vary significantly in size, which can result in material swings in the number of planned projects.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
58	226	341-376	20-35	20-35	665-730

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations

Locations are identified based upon emergent reliability needs.

Reliability Preservation Emergent

Program Description and Purpose

Remediation of issues primarily associated with secondary voltage and emergent small-scale customer reliability needs in order to improve reliability.

Identification/Justification Process

Work is identified by line crews, as well as through customer calls, and is completed to avoid potential service outages, power quality concerns and safety issues. Examples include, but are not limited to, modifying capacitance to address voltage concerns, installing fusing to aid in sectionalizing, and replacing transformers to resolve transformer overload. Budget recommendations are based on historical trends of hours charged.

Scope & Locations

Scope and locations are determined as emergent needs arise.

System Reliability Improvement Projects

Program Description and Purpose

Large-scale improvements to distribution circuits with a history of poor reliability. This program addresses long-term projects, primarily aimed at circuits or substations with poor performance or reliability concerns. However, other proactive long-term projects with proven reliability benefit are included.

Identification/Justification Process

As shown in Figure 4, PPL Electric has experienced increasing storms in its territory which have resulted in negatively trending reliability. Poorly performing circuits are identified through the WPC process or the newly added Circuit Hardening Initiative that focuses on improving system resiliency and SAIFI. The Circuit Hardening Initiative enables engineers to collaborate across departments to evaluate and justify projects that aim to address both large and small scale deficiencies, such as circuit reconfigurations and relocations, device installations, new ties, new lines and terminals, or the installation of substations for increased reliability. More specifically, some of these projects may include removing inaccessible line sections or sections of line in areas of heavy vegetation along the road with increased rights-of-way or undergrounding the section of line. These projects will be constructed with the Company's hardening standards (i.e., increased poles and wire sizes). Projects are approved by supervisors and vetted against other projects for scheduling based on historical reliability, potential benefit, and cost. Worst Performing Circuits, are evaluated quarterly to determine additional reliability projects. Projects may span multiple years and are listed in the years they are planned to go in service. Scope is expected to increase in outer years as additional circuits and projects are identified. Additionally, PPL Electric monitors large customer impact outages on a daily basis. A circuit that begins to show reliability deterioration and notable impact on reliability metrics requires a root cause analysis. Such analysis can result in the identification of a long-term project.

Note that the projects vary significantly in size, which can result in material swings in the number of planned projects.

Scope

Actual, Forecast, and Planned Projects					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
5	7	17-22	310-370	255-305	594-709

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

PPL Electric Utilities Corporation

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	139-164
Northeast	89-112
Central	75-96
Susquehanna	102-121
Harrisburg	170-192
Lancaster	19-24

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$19.23	$21.11	$23.05	$314.53	$300.85	$678.77

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Unreimbursed Highway Relocations

Program Description and Purpose

Unreimbursed customer requested relocations of PPL Electric distribution facilities in support of highway and bridge projects throughout service territory.

Identification/Justification Process

The customers (project sponsors) include PennDOT, the PA Turnpike Commission, and various counties and municipalities. PPL Electric and the project sponsor execute a reimbursement agreement, and PPL Electric is reimbursed for its work based on the "pole count method," as defined in PennDOT's DM-5 manual. Historically, reimbursement for distribution projects is approximately 35%.

To accommodate highway relocations and other municipal projects, approximately 70-120 projects per year are placed in service. PPL Electric typically is notified of distribution relocation work 12 months or less before the start of requested utility relocation activities.

Scope & Locations

Scope and locations are determined as requests are received.

Actual, Forecast, and Planned Expenditures (in millions)

PPL Electric's expenditures to complete highway relocation projects are the net of total expenditures minus the project sponsor's reimbursements.

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$8.87	$10.12	$4.74	$4.26	$4.71	$32.70

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Protection and Control

Program Description and Purpose

Proactive replacement of protection and control equipment to maintain reliable distribution service to customers. Replacement of legacy relays with modern microprocessor relays will also improve fault monitoring and diagnosis processes and will provide added insight into circuit breaker health and risk. Replacement of obsolete Supervisory Control and Data Acquisition ("SCADA") protocols and equipment will also enable relays to perform properly.

PPL Electric Utilities Corporation

Identification/Justification Process

Candidates for replacement are identified based on obsolescence, availability of vendor support, age, and automation enhancement potential. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window.

Scope

Actual, Forecast, and Planned Projects					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
19	130	170-200	145-160	20-30	484-539

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	58-68
Northeast	94-101
Central	81-91
Susquehanna	60-70
Harrisburg	84-92
Lancaster	107-117

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$3.34	$7.58	$37.36	$13.16	$5.73	$67.17

**2025 Forecast includes actuals though June 30th and the remaining plan for the year.*

PPL Electric Utilities Corporation

Appendix A: Average Age of Major Units of Property

The below chart is a summary of key distribution assets, targeted for planned replacement and proactive installation.

Average Age of Major Units of Distribution Property		
Utility Account	Description	Avg Asset Age
362.0 - Station Equipment	DC Sytem Equipment	22
362.0 - Station Equipment	Substation Animal Guards	13
362.0 - Station Equipment	Power Circuit Breakers	36
362.0 - Station Equipment	Power Transformers	44
362.0 - Station Equipment	Protection and Control Equipment	55
364.4 - Poles and Fixtures	Distribution Wood Poles	45
365.0 - Overhead Conductors, Device	Distribution Animal Guards	10
365.0 - Overhead Conductors, Device	OH Primary Conductor	53
365.0 - Overhead Conductors, Device	Air Break Switches	16
365.0 - Overhead Conductors, Device	Automatic Switches (Primarily OCRs/VCRs)	13
365.0 - Overhead Conductors, Device	Disconnect Switches	38
367 - Underground Conductors	UG Primary Conductor (includes Getaways and Cross Yard Ties)	30
366.0 - Underground Conduit	Equipment Foundation, Man Holes, Transformer Vaults (excl Conduit)	27
368.4 - Submersible or Padmt Type	UG Transformers (include LTN Transformers and Network Protectors)	28

PPL Electric Utilities Corporation

Appendix B: Asset Contribution to Reliability Metrics

The below table provides a summary of customers interrupted ("CI") and Customer Minutes Interrupted ("CMI") by failed component. Note that both transmission and distribution substation outages are included in the Substation component asset type.

Component Asset Type	Component Desc	2020		2021		2022		2023		2024	
		CI	CMI	CI	CMI	CI	CMI	CI	CMI	CI	CMI
Distribution	OH-Capacitor Bank	490	12,697	1,020	50,662	2,593	58,670	1,135	49,329		
Distribution	OH-Lightning Arrester	2,702	290,321	2,151	293,442	3,979	326,471	4,685	373,443	1,215	242,699
Distribution	OH-Other Equipment(explain)	6,109	451,306	3,456	313,318	10,372	824,157	1,755	269,398	3,062	277,129
Distribution	OH-Pole/Arms Attachments	35,347	3,959,531	43,737	5,505,965	54,881	6,093,564	42,745	5,103,878	52,584	8,898,926
Distribution	OH-PRI Splices and Connectors	15,181	980,526	15,620	1,443,678	10,386	1,359,976	13,340	1,601,111	16,463	2,135,092
Distribution	OH-Primary/Neutral	116,882	14,222,141	103,465	13,187,676	88,710	11,325,422	78,887	12,524,653	113,600	19,132,653
Distribution	OH-SEC Splices and Connectors	1,710	151,429	1,690	208,053	2,621	257,425	1,913	236,688	1,889	214,358
Distribution	OH-Secondaries/Services	3,283	370,513	3,369	379,299	4,208	598,674	3,093	301,747	4,314	613,787
Distribution	OH-Switch/Automatic	15,214	1,330,628	25,270	2,014,136	32,441	2,419,922	24,882	2,624,766	27,593	3,486,750
Distribution	OH-Switch/Manual/AB/Disc/OS/LBD	6,291	401,764	5,692	297,479	6,712	543,795	6,840	513,781	7,010	2,324,929
Distribution	OH-Tap Fuse/Cutout	7,764	841,505	7,116	925,719	8,950	984,354	7,523	1,003,536	8,876	2,037,594
Distribution	OH-Transformer	7,292	1,225,848	8,189	1,171,421	6,862	1,260,106	5,429	732,841	5,233	1,235,849
Distribution	OH-Transformer Fuse/Cutout	20,863	2,208,699	18,545	2,025,416	18,616	2,071,875	16,754	1,944,057	15,688	2,120,017
Distribution	UG-Elbows	480	274,811	937	212,896	144	38,867	412	88,214	254	48,470
Distribution	UG-Lightning Arrester	120	21,331	76	12,064	148	22,618	139	8,315	34	6,857
Distribution	UG-Load Break Junctions	73	16,468	164	58,516	70	18,213	12	3,395	95	41,801
Distribution	UG-Low Tension Network	5	315			3,070	53,304				
Distribution	UG-Other Equipment(explain)	1,444	155,257	7	795	130	18,348	54	6,717	265	60,309
Distribution	UG-Pads/Vaults/MHs & Splice Boxes	102	18,971	801	150,036	408	64,039	432	67,739	147	55,498
Distribution	UG-PRI Splices and Connectors	343	38,591	791	53,784	466	19,972	2,772	256,673	693	179,065
Distribution	UG-Primary Cable/Neutral	15,006	2,304,340	12,565	2,377,282	16,972	2,727,774	11,435	2,047,963	16,746	3,263,627
Distribution	UG-Riser Pole Equip & Devices	306	41,973	948	131,556	2,969	268,668	875	135,049	3,221	406,588
Distribution	UG-SEC Splices and Connectors	2	324	33	1,193	63	11,420	6	513	13	3,020
Distribution	UG-Secondaries/Services	310	50,241	377	80,910	563	131,513	303	63,036	478	92,554
Distribution	UG-Switchgear	441	87,554	712	142,733	1,164	160,148	874	240,217	3,125	308,646
Distribution	UG-Transformer/Transformer Fuse	1,041	232,250	2,915	336,981	2,647	507,851	2,085	347,343	1,758	443,608
Substation	SUB-Circuit Breaker	28,289	1,766,321	9,349	202,774	1,072	10,542	2,685	104,720	4,149	78,109
Substation	SUB-Control/Relay			730	9126.98	622	26665.14				
Substation	SUB-Insulator			3539	31055	14572	233048.97	1892	105952	3334	25387.29
Substation	SUB-Lightning Arrester					986	83455.04				
Substation	SUB-Other Equipment(Explain)	35,104	366,321	499	14,436	56	12,472	84	8,453	952	140,595
Substation	SUB-Power Fuse	2,823	26,593	67	355	1,952	11,712				
Substation	SUB-Structure							7885	134028.99		
Substation	SUB-Switch/Automatic							79	7034.95	1288	77489.9
Substation	SUB-Switch/Manual/AB/Disc/LBD	22,157	486,661	4	1,982					1,825	104,495
Substation	SUB-Transformer	7,719	118,942					1,804	14,468	71	16,717
Total		354,893	32,454,169	273,834	31,634,739	299,405	32,545,042	242,809	30,919,056	295,975	48,072,621

PPL Electric Utilities Corporation

Long-Term Infrastructure Improvement Plan

CLEAN VERSION

PPL Electric Utilities Corporation

Long-Term Infrastructure Improvement Plan

PPL Electric Utilities Corporation

Table of Contents

PPL Electric Utilities Corporation

Introduction

PPL Electric Utilities Corporation ("PPL Electric" or "Company") is submitting this Long Term Infrastructure Improvement Plan ("LTIIP") pursuant to the requirements of Subchapter B, Distribution Systems, of the Public Utility Code, 66 Pa.C.S. §§ 1350-1360, the Public Utility Commission's ("PUC") Implementation Order for Establishment of a Distribution System Improvement Charge, entered on August 2, 2012 at Docket No. M-2012-2293611 and the Commission's regulations at 52 Pa. Code §§ 121.1 et seq. This LTIIP addresses a broad spectrum of Distribution Asset Management initiatives that the Company will use to continue its repair, improvement and replacement of aging infrastructure under this process, and is for the five-year period beginning January 1, 2023, and ending December 31, 2027.

PPL Electric strives to operate as efficiently as possible by performing the work required to maintain system integrity and reliability. Performance indicators such as System Average Interruption Frequency Index ("SAIFI"), Customer Average Interruption Duration Index ("CAIDI") and System Average Interruption Duration Index ("SAIDI") show that PPL Electric's reliability performance is trending downward, primarily due to storm impacts in the territory. The increase in storm events in the past five years in addition to the recent increase in equipment failures due to an aging infrastructure, indicate that PPL Electric needs to increase investment in its distribution system.

PPL Electric has seen a significant increase in storm events in the past five years, with 2025 on track to have the most events in recent history. The impact of these storms has led to increased storm related outages and decreased performance in CAIDI, SAIDI, SAIFI and CEMI. PPL Electric has recently missed the PUC Benchmark for PUC SAIDI and CAIDI, and in 2024 also missed the PUC SAIFI benchmark, all of which were primarily driven by increased storm events. To address the increased storm events, PPL Electric needs to increase efforts to harden its system to protect against weather related outages and improve the experience for its customers.

Addressing aging infrastructure will require ongoing investment. Such investment includes not only replacing aging equipment, but also investment in advanced equipment and communication technologies that can facilitate further system reliability improvements. If continued proactive re-investment does not occur, it is expected that system reliability will degrade, while the overall cost to maintain the distribution system will continue to rise. By investing in its distribution system, PPL Electric will ensure that its system continues to be safe, reliable, and able to meet the growing needs and expectations of its customers.

PPL Electric believes that managing finite resources to produce optimal results is essential for maintaining customer satisfaction. Criteria for program inclusion into the Long-Term Infrastructure Improvement Plan is not whether any single activity produces a positive reliability result, but rather, which portfolio of activities produces the best result for a given expenditure. PPL Electric's goal is focused on results (i.e., the reliability experienced by customers and associated rate impacts); therefore, the LTIIP is strategically designed to help meet those reliability goals.

Reliability Experience

The Distribution Asset Planning process employed by PPL Electric has been focused on maintaining reliability at the level that existed prior to passage of the Electricity Generation Customer Choice and Competition Act ("Customer Choice Act"). Since the 1994-1998 benchmark period, which defines PPL Electric's reliability performance targets, PPL Electric's service reliability has experienced annual swings, positive and negative,

resulting largely from varying weather conditions. Historical benchmark performance is illustrated in Figures 1 and 2.

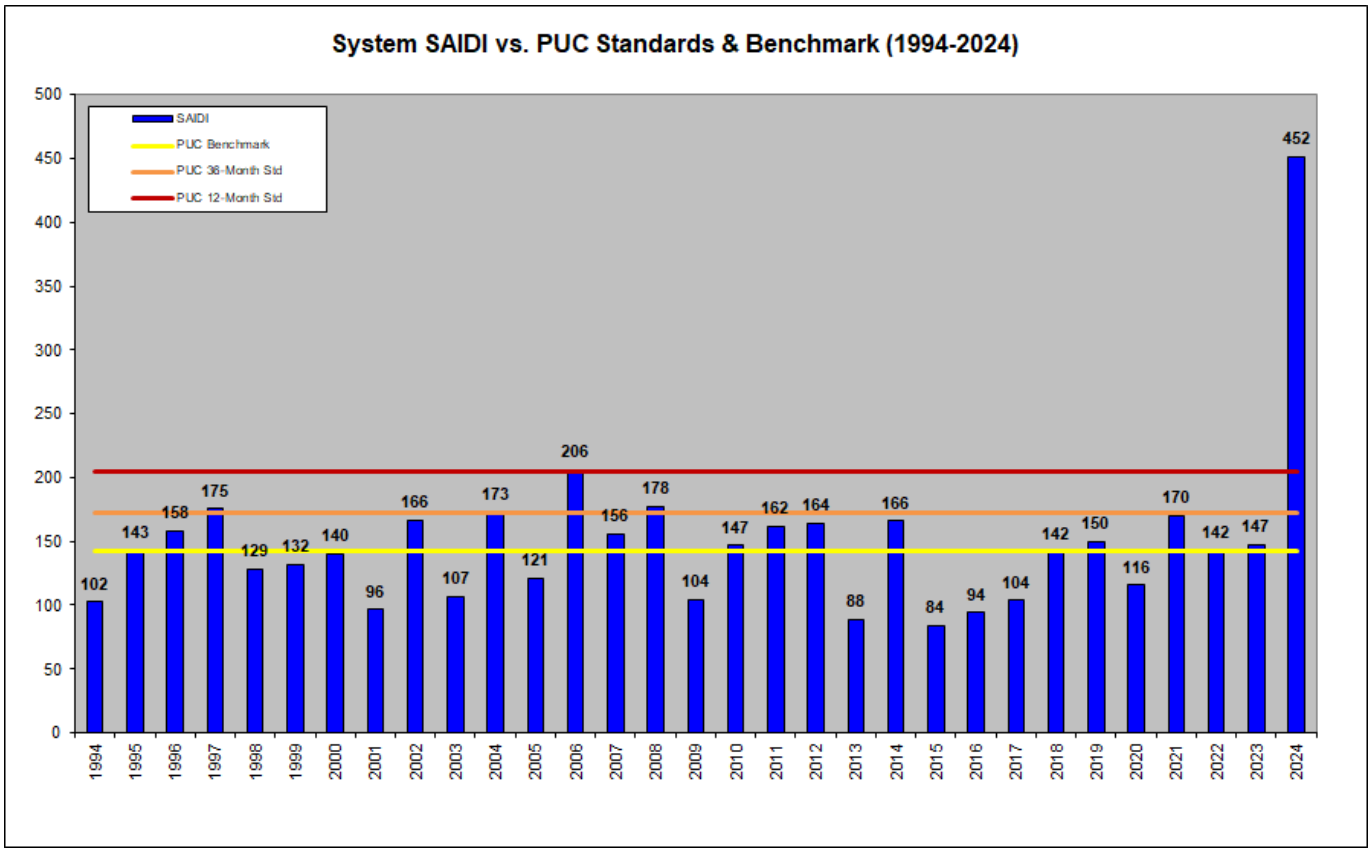


Figure 1: PPL Electric's SAIDI Performance

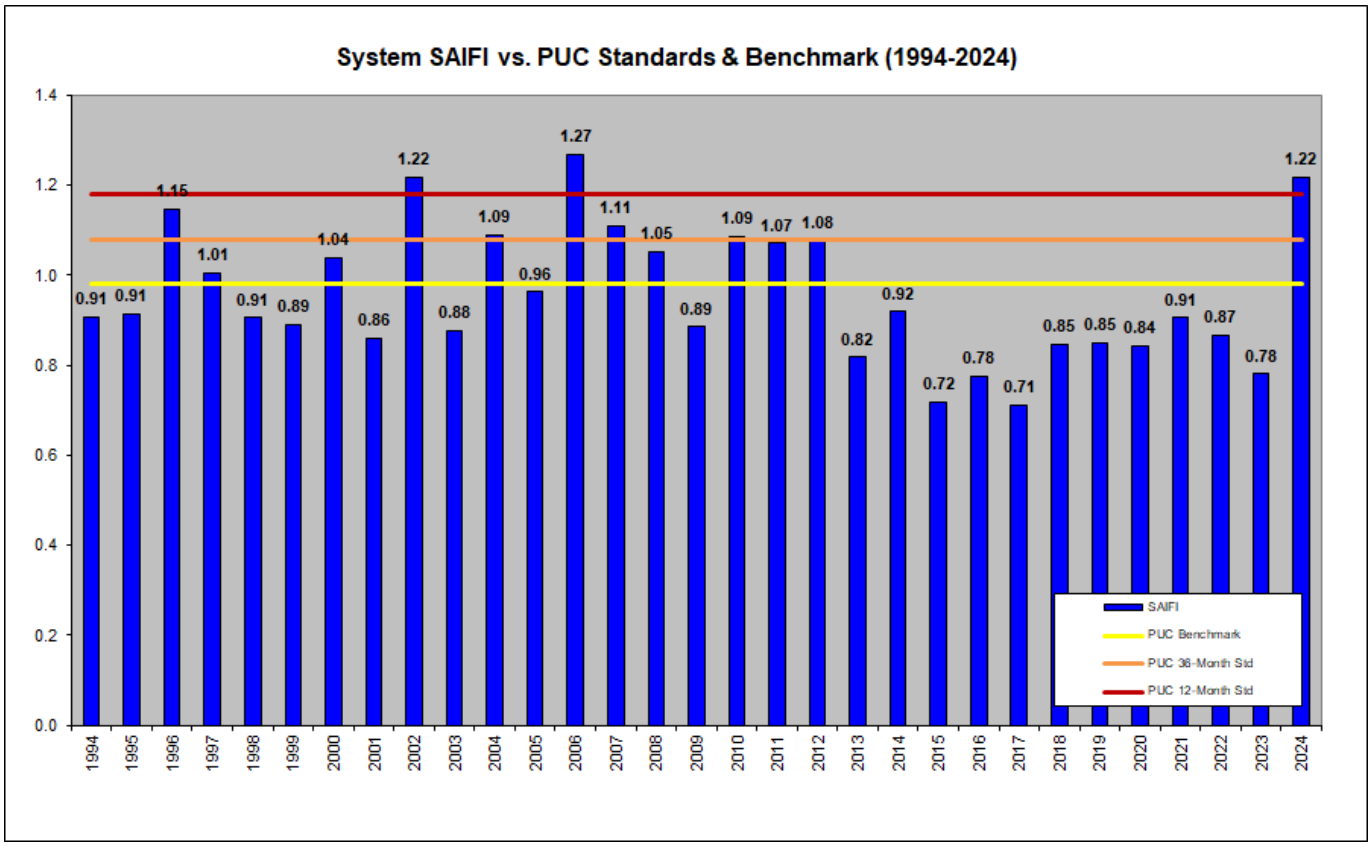


Figure 2: PPL Electric's SAIFI Performance

A significant risk to PPL Electric's ability to meet reliability benchmarks is the large portion of distribution facilities that are now beyond or nearing the end of their design lifetime. See Appendix A for average age of major units of property. The resultant effect on non-storm-related equipment failures is illustrated by the chart in Figure 3 below.

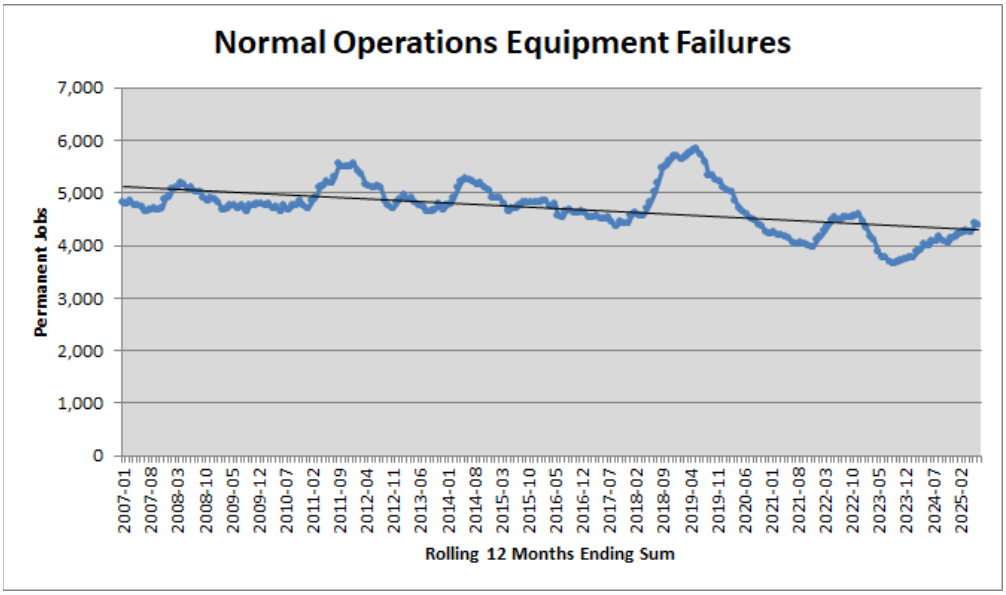


Figure 3: Equipment Failure Service Interruption Cases

The number of no-light cases due to equipment failures is trending slightly upward in recent years, which shows the need to continue investment in replacing aging infrastructure on PPL Electric's system. The need to remediate that equipment which is at or near end-of-life remains to improve this trajectory. Components contributing the most significantly to distribution equipment failures include poles/arms/attachments, overhead and underground conductors, and switches. See Appendix B for further details on asset contribution to reliability metrics.

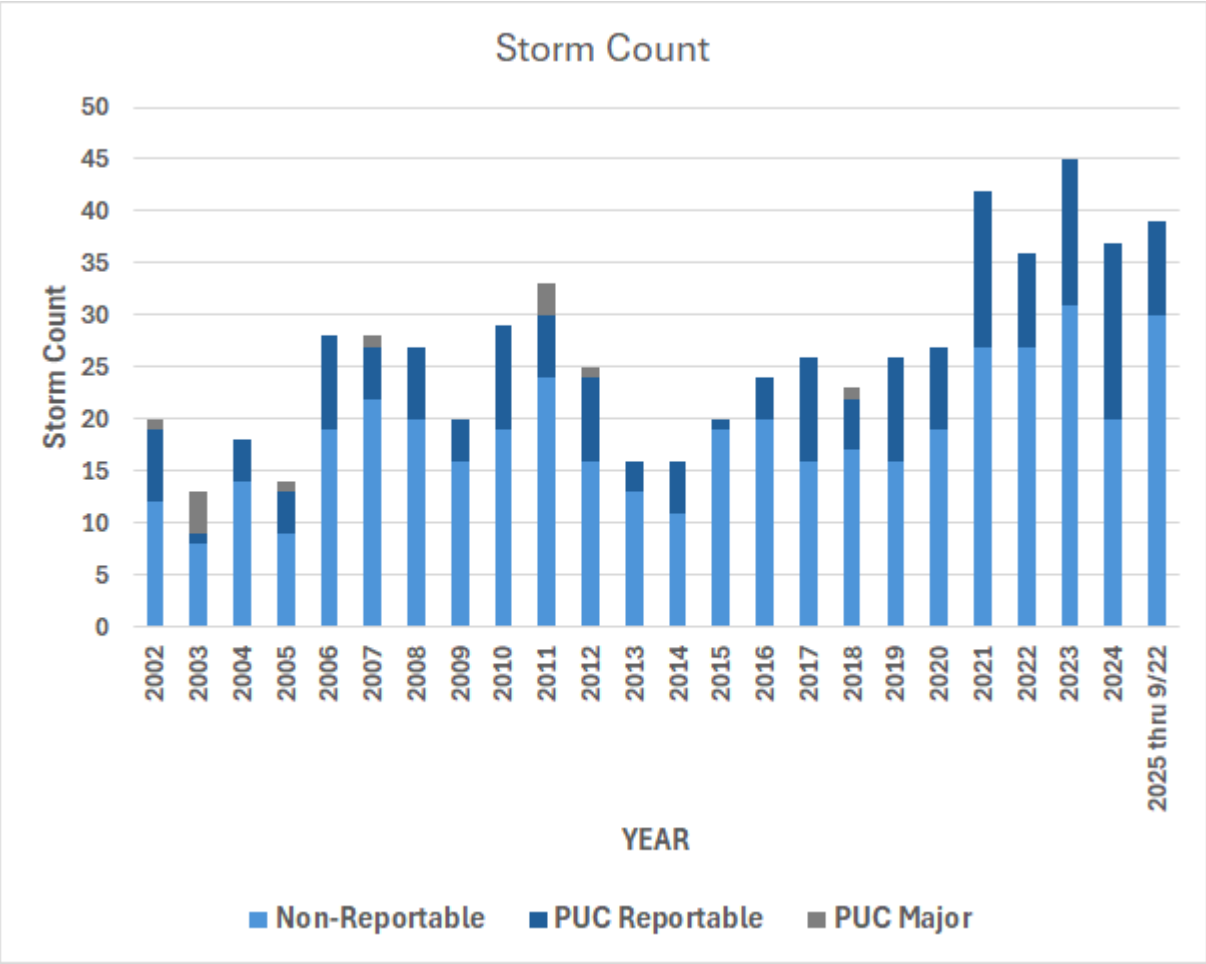


Figure 4: PPL EU Storm Frequency and Count

As shown in the graph above, PPL Electric has experienced increasing storms in the territory, which have resulted in negatively trending reliability. In the recent PUC Management and Operations Audit, it was noted that PPL Electric needed to improve its SAIDI, CAIDI, and CEMI metrics. The primary driver for the poor performance in those reliability metrics was the recent increase in storm frequency and impacts. In 2024, the year after the audit was conducted, PPL Electric experienced its worst reliability year in recent history, with all metrics missing benchmark. Through September 22, 2025, the Company has already seen 39 storm events. In order to improve system reliability, PPL Electric needs to strengthen and harden its system to be more resilient to weather related events.

Response to Increased Storm Events

PPL Electric's circuit hardening efforts look to improve reliability on its worst circuits and sections of circuits that have experienced poor reliability. Such efforts include, but are not limited to:

- Rebuild lines to hardened standards which include stronger poles, covered conductors and other hardened standards.
- Relocate sections of heavily vegetated or inaccessible lines to non-vegetated areas or underground.
- Limit customer exposure on circuits by adding new circuits or substations.
- Build new tie lines to be able to automatically re-energize customers in the event of an outage using the Company's Smart Grid system.

Response to Aging Equipment

PPL Electric's reliability investment process is forward-looking and proactive. It consists of the following:

- Analyze and identify the drivers of historical trends of causes of service outages and other power service problems.
- Forecast future reliability metrics (SAIDI, SAIFI, and CAIDI) given existing mitigation programs' effect on the identified drivers.
- Identify new programs, policies, and activities to enhance or accelerate existing mitigation programs to avoid forecasted gaps between future reliability and benchmark targets.
- Identify, evaluate, and implement new technologies that enhance the Company's condition monitoring strategy.
- Evaluate and adjust existing programs, policies, and activities to produce the desired future results.
- Perform targeted data analytics against the Company's aging infrastructure utilizing real-time, or near real-time, operational data to further improve reliability performance.
- Incorporate the resulting portfolio of existing and new programs, policies, and activities in PPL Electric's five-year business plan.

In February 2018, PPL Electric's Reliability Principles and Practices ("P&P") were revised to help reduce the overall impact to the Company's customers from outages due to various causes, including but not limited to, equipment failures. The P&P sets forth a set of Principles that PPL Electric follows to plan, protect, and operate the Electrical Distribution System ("EDS"). These Principles are implemented through a set of standard Practices that are used as guidelines in designing the EDS. These Practices are reasonable, acceptable, and consistent with leading utility practices. More specifically, to reduce the number of customers experiencing permanent outages and

outage duration over the long term, the following circuit design guidelines are used wherever practical, starting with those identified as Worst Performing Circuits ("WPCs")[1]:

- Provide three-phase line ties that will support the transfer of all but approximately 500-750 customers for 100% of the year.
- Provide sectionalizing devices to limit customer count to no more than approximately 500-750 customers between devices.
- Limit customer count to less than approximately 1,500 customers per circuit.
- Limit line length to approximately 70 circuit miles

Prioritization utilizing these design criteria is based on the greatest expected improvement in reliability for the entire system.

Several other mitigation initiatives have been undertaken to reduce the forecasted short-term equipment failure growth rate.

- **Enhanced Pole Inspection/Treatment Program:** Beginning in 2021, the Company's wood pole inspection and treatment program was enhanced from a subjective inspection process to an objective, resistance drill-based methodology. The resistance drill inspection allows a complete pole health assessment, with both interior and exterior decay accurately measured. This holistic strength assessment of the pole is the most accurate and thorough pole inspection possible. As an integral part of the twelve-year pole inspection process, PPL Electric observes, notes, and reports at-risk conditions of all pole attachments, specifically crossarms, braces, conductors, transformers, fuse cutouts, lightning arresters, reclosers, regulators, capacitors, switches, wildlife protection, vegetation encroachment, guys, anchors, ground wires, and ground rods.
- **Increased Utilization of Infrared Inspections:** PPL Electric conducted a trial of infrared inspections of multi-phase lines in 2006. The trial inspections cost $122,500 and identified repairs costing $100,000, saving an estimated 1,460,000-2,600,000 Customer Minutes Interrupted ("CMI"). Funding of infrared inspections and repairs was increased significantly during 2010 and has remained at a higher funding level. Infrared inspections occur on all 3-phase and 2-phase overhead lines adjacent to roadways every two years.
- **Proactive Circuit Analysis ("PCA"):** PCAs are performed on each circuit on a four-year cycle. The review analyzes and addresses both operational and reliability characteristics of each circuit. Voltage support, phase balancing, protection coordination, power factor maintenance and loading issues are addressed from an operational perspective. Service outage analysis, exposure analysis, and field checks address reliability and power quality.
- **Distribution Automation Strategy:** In 2010, PPL Electric launched a "smart grid" pilot project that enables the Company to react rapidly to changes on the delivery system, and to automatically re-route power around problems that occur. The project initially focused on the Harrisburg, Pa. area, but has since been expanded to cover all of the

[1] PPL Electric uses a weighted circuit SAIDI and circuit SAIFI contribution over the previous three years to define the WPCs on its system. IEEE Major Event days, transmission outages, and scheduled outages are excluded. This ranking system was put in place as of the first quarter of 2025.

Company's service territory. The project included the implementation of an advanced Distribution Management Systems ("DMS"), which was a breakthrough technology that enables the Company's operators to see the status of PPL Electric's distribution network in real-time. In 2016, PPL Electric completed a system wide rollout of Fault Isolation and Service Restoration ("FISR") technology. FISR identifies faulted sections and quickly develops an optimized restoration plan, then automatically executes that plan. Customers typically can be restored within five minutes from the start of the outage. This milestone is an industry first and has saved over three million customer interruptions since the start of the program through June of 2025. Over 8,600 automated smart devices have been installed, which has allowed for remote operation and monitoring of circuit sectionalizing equipment.

Although these programs have successfully slowed failure growth rates in the short-term, PPL Electric faces a long-term issue regarding aging infrastructure. The surge in electrical construction in the 1960's and 1970's has resulted in a large number of assets that have reached or are nearing the end of their useful lifetime. Consequently, in 2008-2009, PPL Electric conducted a major condition assessment and maintenance study of its distribution system. The result was the implementation of the Asset Optimization Strategy ("AOS"). The study found that programmatic and accelerated replacement of infrastructure would be the most cost-effective strategy to address aging infrastructure and ensure system reliability and integrity.

Asset Optimization Strategy

The purpose of the AOS study was to develop a strategy for accelerated capital replacement improvements that would combat the anticipated effects of aging infrastructure and bolster PPL Electric's ability to effectively maintain reliable electric service. With the Company entering a period where a significant number of assets are expected to reach the end of life, a plan was developed to intelligently replace assets prior to an unplanned failure that impacts customers. The plan includes replacements in kind, as well as upgrades to current standards.

Examples of AOS Projects include proactive replacement of substation equipment, Low Tension Network ("LTN") equipment, and vintage underground cable based on condition-based health analysis.

Accelerated Investment

As a result of the AOS study, PPL Electric approximately doubled its planned level of investment in DSIC-eligible property from 2009-2012. During this period, non-storm equipment failures fluctuated but continued to show a slight upward trend. PPL Electric continued to accelerate planned capital investments during the periods 2013-2017 and 2018-2022 to address an upward trend in equipment failures that peaked in 2018-2019 (see figure 3 above).

Period	Avg Annual Capital investment (in millions)
2008-2012	$88
2013-2017	$137
2018-2022	$180

Figure 5: Approximate average annual capital investment in millions. Not adjusted for inflation.

As a result of these investments, PPL Electric arrested the increase in failed equipment; however, in recent years the trend of failures has begun to increase again. Even with these investments, the average age of equipment increased slightly since the 2018-2022 plan.

Implementation of Long-Term Infrastructure Improvement Plan

The Long-Term Infrastructure Improvement Plan, in addition to various other prudent capital investments, helps to ensure the safety and reliability of the distribution system. The investments since the LTIIP was initially put into place had arrested and reversed the growth trend in equipment failures, however, as noted above the trend has started to increase in recent years. Equipment failure trends and asset-specific contributions to system-level reliability metrics are analyzed on an ongoing basis to ensure funding is invested appropriately.

PPL Electric routinely reviews the effectiveness of programs to ensure cost-effective investment. Program/project impact on SAIDI and SAIFI, in addition to potential reductions in outage response costs, is compared to the overall program/project costs. PPL Electric utilizes a project prioritization process that defines the cost-effectiveness of programs/projects to ensure effective optimization of reliability investments. PPL Electric currently is improving the use of ongoing asset health indices to further refine asset replacement criteria.

Ongoing review of the effectiveness of investments to address equipment failure trends will likely result in adjustments to the strategy over time. Future Long Term Infrastructure Improvement Plans will reflect such adjustments. Additionally, work plans may fluctuate throughout a given year due to the need to reallocate resources in response to changing business needs. Some examples include shifting resources for storm response activities, project construction delays caused by a backlog of material deliveries, and the redirection of investment to cure costly equipment failures. In addition, during the project engineering phase, issues such as right-of-way requirements and environmental considerations can result in scope changes that also can delay actual construction. During construction of larger projects, additional scope needs can be identified, creating the need to defer other projects. Finally, reliability metric performance can result in redirection of spending to help ensure the ability to meet targets.

Projected expenditures for the replacement of failed equipment are based on a review of historical trends while considering current failure rates and proactive mitigating measures. For such programs, it is difficult to project the specific scope and location. Therefore, PPL Electric has provided only planned expenditures based on historical trending information.

Utility Outreach

PPL Electric continues to remain engaged, seeking out opportunities with other utilities and government officials on the planning and execution of future construction projects. A forum exists with the Utility Highway Liaison Committee ("UHLC"), with whom PennDOT, the Turnpike Commission, other utilities, and the Energy Association of Pennsylvania meet quarterly to discuss policy issues, present and future projects, and relocation projects. The Company is a regular participant. Initiatives at these forums are focused primarily on improving state and utility interactions.

PPL Electric also participates in various Pennsylvania Coordinating Committees, including the Northeast PA ("NEPA") Regional partnership, the Lancaster County Regional Partnership, the Lehigh Valley Regional Partnership, and the Lycoming County Area Coordinating Committee. These meetings are held monthly, bi-monthly, or quarterly to discuss and share project plans with stakeholders including utility companies, PennDOT, public works officials and planning commission members.

Utilization of a Qualified Work Force

PPL Electric Workforce

As a measure to ensure the use of a qualified workforce, PPL Electric has adopted the definition of a Qualified Electrical Worker from the Occupational Safety and Health Administration ("OSHA") Regulation 29 CFR § 1910.269 Electrical Power Generation, Transmission and Distribution, which is defined in the PPL Electric Safety Rule Book and is provided to each employee. It is also incorporated into the training and qualification process for all electrical workers.

PPL Electric administers a rigorous, formal training and evaluation process for all qualified electrical workers. Training is required before an employee may perform work independently on exposed, energized electrical equipment greater than 50 volts. Training requirements and programs are unique to the job classification and work being performed. Curriculum documents, outlining subject areas and training durations by job classification have been developed. Training may require up to 5 years to complete and incremental qualifications, following assessment, are identified throughout the duration of the training program. Retraining is conducted on a periodic basis as required by OSHA or more frequently when determined necessary.

PPL Electric Utilities Corporation

PPL Electric's formal training programs are administered by the Technical Training & Development group. The training section of the group is comprised of both training professionals and craft employees. Experienced training professionals lead the design and development of the training programs with input from subject matter expertise provided by craft employees from the field. Training program (curriculum) content is approved by a curriculum committee which is comprised of business line managers. The basic job requirement for an instructor includes 5-years of experience performing the work and attainment of Journeyman level (or equivalent) qualifications. Craft instructors are then trained and mentored. Training delivery is governed by PPL Electric policies and procedures to ensure quality and consistency.

Training is delivered in phases. A phase typically consists of a grouping of training modules into one training period of several days to several weeks. Training consists of both classroom and field work to gain hands-on practical learning experience. Trainees are evaluated throughout the program. Evaluation includes written examination and/or a performance examination. Employees must successfully complete each training module before progressing to the next phase of training.

In addition, trainees in key programs must complete an additional skills assessment prior to advancement to the next step. These assessments are coordinated by the TD&I group. The employees are evaluated (graded) by a panel comprised of knowledgeable field supervisors and experienced bargaining unit craft members. This independent evaluation serves as a quality control check on the TD&I training section.

Over the next 5 years, PPL Electric will be executing a resource strategy which includes formal training classes to hire and train new employees in preparation for upcoming attrition.

Contractor Workforce

PPL Electric's Sourcing department administers a standard process for soliciting contractors to perform work identified to be completed by independent contractors. The process includes issuance of a Request for Proposal ("RFP") to various contractors. That process includes a meeting to review the technical and administrative components of the work and normally a walk-down of the project area. Responses to the RFP are evaluated based on detailed financial and technical schedules that compare respondents' capabilities. Part of the RFP evaluation process includes evaluating the qualification of contractors to perform work (both technical and financial capabilities to meet the contractual commitments, and level of qualification of employees) and may include reference checks if appropriate. Any specific required qualifications of contractors would typically be outlined in the RFP and/or contract (for example: pole installation, permit and tag authorities, line construction by specific voltage, live line work, foundations, directional bore/trenching, underground networks).

Most independent contractors employ personnel through the building trades, which includes Union apprenticeship programs to help ensure that employees are qualified to perform assigned work. (This approach is comparable to PPL Electric's Union labor qualification training program.) Employee qualification programs for non-Union independent contractors are stringently reviewed to assess the contractor's training program, such as on-the-job training and certification programs.

Prior to award, contractors are screened for their safety performance and, if applicable, environmental record. Contractors that do not have an acceptable record receive no further consideration. In the event that a contractor working for PPL Electric incurs safety incidents and/or does not take appropriate safety measures, the contractor is terminated and prohibited from performing work for PPL Electric in the future.

PPL Electric Utilities Corporation

PPL Electric has instituted a contractor orientation program that provides new contractors an opportunity to understand company expectations for performing work safely, mindful of public and private landowner considerations and administrative concerns (such as billing). PPL Electric also performs weekly safety and workmanship review meetings with the Company's contractor work force to review safety issues and other relevant topics

PPL Electric sponsors a training program that allows the contractors' employees to become qualified in PPL Electric's permit-and-tag system. Contractor employees who successfully complete the training program can be permit holders on PPL Electric's system.

PPL Electric monitors the contractors' performance through several activities that may include direct job oversight through on-site supervision, monthly scorecards that evaluate such areas as job quality, safety performance, cost, and validating billing activities that meet contractual expectations. If safety concerns are identified at a job site, any person has the ability and express duty to cease work until the concerns have been appropriately addressed, and a safety review team could be assembled to formally request a contractor to respond to safety concern. Safety violations could result in immediate contractor termination.

PPL Electric's Project Construction Supervisors continuously monitor the quality of all contractor work and adherence to PPL Electric's Construction Standards. Where the contractor installs specialized equipment on critical facilities, special Quality Assurance review are performed which may include inspection of grounding, trench, foundations, final grade, structural components, poles/towers, conduits, electrical equipment, primary conductor, wiring, designations, and final completion of the Acceptance of Facilities form). Any failures are described along with description and dates of corrections to resolve the areas of concern before final acceptance of the contractor's quality of work.

PPL Electric Utilities Corporation

Summary

As a result of the economic expansion and building boom of the 1960's and 1970's, much of PPL Electric's distribution system was originally constructed 50 or more years ago. As this equipment deteriorates due to age, environmental exposure, and added load, it becomes increasingly critical to plan for the repair, upgrade, and/or replacement of these assets through the initiatives described above. In the absence of these initiatives, the efficiency, safety, and reliability of the electric distribution system is expected to be increasingly compromised. PPL Electric believes that the expenditures for these initiatives constitute a prudent and reasonable investment for managing its distribution assets and that each of the listed programs will successfully achieve one or more of the following benefits:

- Maintaining public and employee safety
- Reducing service outage durations and number of customers affected
- Reducing service outage restoration times
- Reducing service outage locating and repair times
- Controlling service outage repair costs
- Limiting failure-related damages and related costs, and
- Improving/maintaining power quality (voltage, flicker, etc.)

To achieve these results, PPL Electric anticipates the need for the following total capital expenditures with corresponding quantities of units/projects over the 2023-2027 period. Note that planned expenditures for certain initiatives can fluctuate yearly due to the various factors identified previously.

	Millions of dollars invested					
	2023	2024	2025	2026	2027	Total
Poles	$ 11.40	$ 12.58	$ 29.07	$ 21.94	$ 21.94	$ 96.93
New Electronic Reclosers	$ 2.10	$ 3.62	$ 8.28	$ 6.50	$ 8.98	$ 29.48
Distribution Animal Guarding	$ 0.20	$ 0.63	$ 0.20	$ 0.30	$ 0.27	$ 1.60
Failed Equipment	$ 42.85	$ 55.59	$ 44.14	$ 38.17	$ 35.15	$ 215.90
Underground Cable Replacement and Life Extension	$ 0.52	$ 0.39	$ 5.72	$ 3.20	$ 3.07	$ 12.90
Low Tension Network Primary Cable, Equipment and Structures	$ 0.54	$ 1.58	$ 1.86	$ 5.33	$ 3.50	$ 12.81
Substation	$ 11.25	$ 16.38	$ 32.46	$ 42.56	$ 58.80	$ 161.46
LTN Upgrades	$ 6.87	$ 4.90	$ 4.33	$ 7.44	$ 5.91	$ 29.45
Reliability	$ 9.19	$ 15.62	$ 11.31	$ 11.55	$ 10.37	$ 58.04
System Reliability Improvement Projects	$ 19.23	$ 21.11	$ 23.05	$ 314.53	$ 300.85	$ 678.77
Unreimbursed Highway Relocations	$ 8.87	$ 10.12	$ 4.74	$ 4.26	$ 4.71	$ 32.69
Protection and Control	$ 3.34	$ 7.58	$ 37.36	$ 13.16	$ 5.73	$ 67.17
Total	$ 116.36	$ 150.10	$ 202.51	$ 468.93	$ 459.29	$ 1,397.20

Category	2023	2024	2025	2026	2027
Poles	2,131	2,345	3,800-4,900	2,300-2,900	2,300-2,900
New Electronic Reclosers	182	72	249-275	155-171	231-255
Distribution Animal Guarding	56	362	240-360	240-360	240-360
Failed Equipment	*Scope and locations determined as equipment fails*				
Underground Cable Replacement	0	66	350-400	200-300	200-300
Low Tension Network Primary Cable, Equipment and Structures	2	3	10-25	80-105	30-44
Substation	64	50	146-221	155-201	144-191
LTN Upgrades	29	37	164-184	185-214	8-12
Reliability	58	226	341-376	20-35	20-35
System Reliability Improvement Projects	5	7	17-22	310-370	255-305
Unreimbursed Highway Relocations	*Scope and locations determined as requested*				
Protection and Control	19	130	170-200	145-160	20-30

Almost all of the aforementioned initiatives take advantage of new technologies that did not exist when the associated assets were originally placed into service, and many of these technologies are very recent innovations. These technologies are expected not only to restore the assets to their original level of performance, but, in many cases, provide performance well beyond what previously was achievable in order to ensure and maintain adequate, efficient, safe, and reliable service.

Some of the initiatives clearly have implied endpoints, where no further opportunities for improvement remain. Others eventually experience diminishing returns over time. Other initiatives, such as pole reinforcement and replacement, will be ongoing. Finally, some programs may become obsolete, while new programs may become desirable as a result of the evolution of new technologies. Because of these and other variables, the effectiveness of these programs is reviewed annually, and programs are added, deleted, and/or modified, as necessary, to ensure that the expenditures are providing the desired benefits to customers at a reasonable cost.

Distribution Assets

The following pages detail 5-years projections for Long-Term Infrastructure Improvements initiatives that apply to distribution line assets. These assets include, but are not limited to, the following:

- Structures
    - Poles
    - Crossarms
    - Vaults
    - Manholes
- Overhead Conductors and Hardware
- Underground Cables and Hardware
- Switching Devices
    - Air Break Switches
    - Disconnect Switches
    - Switching Cabinets

- Protective Devices
  - Fuses
  - Reclosers
  - Network Protectors
  - Lightning Arresters
- Transformers
  - Overhead
  - Pad-Mounted
  - Submersible
  - Low Tension Network

Poles

This category includes the replacement and reinforcement of wood poles to maintain reliability, ensure public safety, and further storm harden the system.

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$11.4	$12.58	$29.07	$21.94	$21.94	$96.93

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Distribution Pole Replacements

Program Description and Purpose

Replacement of distribution wood poles identified as non-restorable (cannot be reinforced) during the annual inspect and treat program or during a spot inspection in an effort to improve public and employee safety. This program contributes to storm hardening efforts and aims to improve public and employee safety, as well as service reliability, by reducing potential pole failures.

Identification/Justification Process

PPL Electric inspects approximately 75,000 poles per year. Historical data suggests an approximate 5% rejection rate from the population of yearly inspections. Of those poles rejected, 80% are candidates for replacement. Replacing rejected poles avoids property damage and risk of accidental injury, and it mitigates the costs associated with extended service outages.

Scope

The scope of the program is a direct correlation to the number of wood pole inspections.

Actual, Forecast, and Planned Replacements in Units					
2023-Actual	**2024-Actual**	**2025-Forecast***	**2026-Planned**	**2027-Planned**	**Total Scope**
1,420	1,171	3,500-4,500	2,000-2,500	2,000-2,500	10,091-12,091

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations

Specific locations are a direct correlation to the wood pole inspection plan. Inspection locations are identified yearly primarily as a function of previous inspection dates, as well as ensuring cost-effectiveness of the program and minimizing inspection crew movements.

Pole Reinforcements

Program Description and Purpose

Reinforcement of deteriorated distribution wood poles in order to restore the pole's original strength, ensure public safety, and maintain reliable electric service through the reduction of potential pole failures. This program contributes to storm hardening efforts by reducing potential pole failures.

Identification/Justification Process

PPL Electric inspects approximately 75,000 poles per year. Historical data suggests an approximate 5% rejection rate from the population of yearly inspections. Of those poles rejected, 20% are candidates for reinforcement. When applicable, this method achieves a significant savings over pole replacement. The proportion of failed inspections that result in replacements rather than reinforcements has increased for grid resiliency improvement efforts. Higher class poles have become more favorable, thus lowering the threshold for lower class poles to be deemed non-restorable.

Scope

Actual, Forecast, and Planned Reinforcements in Units					
2023-Actual	**2024-Actual**	**2025-Forecast ***	**2026-Planned**	**2027-Planned**	**Total Scope**
711	1,174	300-400	300-400	300-400	2,785-3,085

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations

Locations identified for reinforcement are a direct correlation to the number of wood pole inspections.

New Electronic Reclosers

Program Description and Purpose

Proactive installation of new electronic reclosers on both single-phase and three-phase lines, to improve reliability performance by increasing circuit sectionalizing ability. Reclosers minimize the number of customers affected by a sustained outage.

Identification/Justification Process

Locations are requested by regional reliability engineers and prioritized annually based on anticipated reliability savings.

Scope

Actual, Forecast, and Planned Installations in Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
182	72	249-275	155-171	231-255	889-955

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	152-160
Northeast	162-170
Central	152-165
Susquehanna	141-150
Harrisburg	141-160
Lancaster	141-150

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast ***	**2026 Planned**	**2027 Planned**	**Total**
$2.10	$3.62	$8.28	$6.50	$8.98	$29.48

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Distribution Animal Guarding

Program Description and Purpose

Proactive installation of animal guards on existing distribution overhead transformers and air break switches to improve circuit reliability. Animal guards help prevent animal-related contacts which cause service interruptions.

Identification/Justification Process

Transformers are identified both by opportunistic installation of guarding during other non-related work, and by on-the-spot or follow-up orders after responding to animal-caused outages.

Scope

Actual, Forecast, and Planned Installations					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
56	362	240-360	240-360	240-360	1,138-1,498

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	190-250
Northeast	190-250
Central	190-250
Susquehanna	190-250
Harrisburg	189-249
Lancaster	189-249

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast ***	**2026 Planned**	**2027- Planned**	**Total**
$0.20	$0.63	$0.20	$0.30	$0.27	$1.60

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Failed Equipment

This category includes the replacement of failed or deteriorated distribution equipment, LTN equipment, underground cable, and underground getaways.

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$42.85	$55.59	$44.14	$38.17	$35.15	$215.90

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Distribution Failed Equipment

Program Description and Purpose

Replacement or repair of failed or deteriorated capital units of distribution equipment, excluding underground cable, in order to maintain adequate service reliability.

Identification/Justification Process

Candidates are identified via inspections, both planned and ad-hoc, as well as actual outages and power service problems. Budget allocations are based on historical trends of hours charged to corrective work, in addition to projected trends of future equipment failures. Examples include, but are not limited to, failed reclosers, poles, capacitor banks, and air breaks.

Scope & Locations

Scope and locations are determined as equipment fails.

Replace Failed Underground Cable

Program Description and Purpose

Replacement of failed underground residential primary and secondary cables in order to maintain adequate service reliability.

Identification/Justification Process

Candidates are identified via actual failures. Budget recommendations are based on historical trends of hours charged to corrective work, in addition to projected trends of future equipment failures.

Scope & Locations

Scope and locations are determined as cable fails.

Replace Failed 12 kV Underground Getaway Cables

Program Description and Purpose

Replacement of failed 12 kV underground getaway cables to maintain adequate service reliability. Getaway failures can result in long duration outages. Getaway cables connect substations to outgoing feeders beyond the substation perimeter.

Identification/Justification Process

Candidates are identified via actual failures and cables with poor test results. Budget recommendations are based on historical trends in getaway failure quantities and costs, in addition to projected trends of future getaway failures based on asset health metrics.

Scope & Locations

Scope and locations are determined as getaway cables fail while in service or fail conditionally under testing.

Replace Deteriorated/Failed Low Tension Network Equipment and Structures

Program Description and Purpose

Replacement or repair of deteriorated and failed equipment related to Low-Tension Networks, including network transformers, network protectors, manholes, and vault tops in order to maintain adequate service reliability. Low-Tension Networks are low voltage underground distribution facilities found in urban areas.

Identification/Justification Process

Candidates are identified via actual failures, inspections, testing, or work on the system. Budget recommendations are based on historical trends of corrective work, in addition to projected trends of future equipment failures.

Scope & Locations

Scope and locations are determined as assets fail.

Replace Deteriorated/Failed Area Supply Substation Equipment

Program Description and Purpose

Replacement of failed or deteriorated station facilities at area supply substations with in-kind equipment to maintain safe and reliable service. Identified facilities include, but are not limited to, circuit breakers, power transformers, tie/transfer cables, disconnect switches, DC equipment, and instrument transformers.

Identification/Justification Process

Candidates are identified via actual failures, inspections, and test results. Budget recommendations are based on historical trends in equipment failure quantities and costs, in addition to projected trends of future equipment failures based on asset health metrics.

Scope & Locations

Scope and locations are determined as station equipment fail while in service or fail conditionally under testing.

Underground Cable Replacement

Program Description and Purpose

Programmatic replacement of deteriorated underground cable to maintain reliable electric service.

Identification/Justification Process

Candidates are selected based on history of cable failures and failure risk scores generated by a data analytics model that uses criteria such as segment length, cable age, customer count, and number of tap fuse outages.

Regional allocation of cable remediation is based on historical regional percent contribution to system-wide cable failures.

Scope

Actual, Forecast, and Planned Scope in Cable Segments					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
0	66	350-440	200-300	200-300	816-1,106

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	561-650
Northeast	25-56
Central	55-90
Susquehanna	55-90
Harrisburg	90-140
Lancaster	30-80

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$0.52	$0.39	$5.72	$3.20	$3.07	$12.90

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Low Tension Network Primary Cable, Equipment and Structures

Program Description and Purpose

Programmatic replacement of deteriorated equipment related to Low Tension Networks, including primary underground cable, network transformers, network protectors, manholes, and vault tops. The purpose of this program is to ensure public safety and service reliability through the replacement of underground

facilities that have reached the end of their expected life or that show signs of premature age from prolonged exposure to corrosive environments.

Identification/Justification Process

Primary underground cables for Low Tension Network feeders are reaching their end of useful life and proactive replacements mitigate feeder outages. Replacement and repairs of manhole and vault tops are determined by regular inspections. Network transformer and network protector replacements are determined through inspection and age, where assets exceeding 40 years in service are considered highest priority.

Scope

Actual, Forecast and Planned Replacements in Units (in Work Orders)						
	2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
Primary Cable Replacements	1	2	0-2	0-3	0-4	3-12
LTN Equipment	1	1	10-25	80-105	30-40	122-172

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	LTN Equipment	Cable
Lehigh	12-17	2
Northeast	28-40	0-2
Central	22-31	1-2
Susquehanna	3-5	0-2
Harrisburg	31-43	0-2
Lancaster	26-36	0-2

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$0.54	$1.58	$1.86	$5.33	$3.50	$12.81

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Substation

This category includes replacement of various substation assets and substation animal guarding.

Substation assets include, but are not limited to, the following:

- Structures
  - Enclosures
  - Fences
- Overhead Conductors and Hardware
- Underground Cables and Hardware
- Switching Devices
  - Air Break Switches
  - Disconnect Switches
- Protective Devices
  - Circuit Breakers
  - Fuses
  - Reclosers
  - Lightning Arresters
- Transformers
  - Power
  - Station Service
  - Instrument

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$11.25	$16.38	$32.46	$42.56	$58.80	$161.45

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Underground Getaway Cable Replacements and Life Extension

Program Description and Purpose

Proactive replacement of aging and deteriorating 12 kV underground getaway cables to prevent failures that can result in long duration outages.

Identification/Justification Process

Getaways are selected for proactive replacement based on data analytics risk models that quantify cable health and risk and provide a priority ranking based on risk factors such as age, repair history, installation type, length, load transferability, etc. Scope is additionally identified through inspection feedback and other work.

Scope

Actual, Forecast, and Planned Replacements in Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
5	3	15-20	24-29	30-36	77-93

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	19-22
Northeast	18-21
Central	7-9
Susquehanna	7-9
Harrisburg	17-20
Lancaster	9-12

Miscellaneous Substation Equipment

Program Description and Purpose

Programmatic replacement of older substation equipment, including air break switches, potential transformers ("PTs"), capacitance-coupled voltage transformers ("CCVTs"), circuit switchers, lightning arresters, voltage regulators, and DC panels in order to prevent future maintenance concerns and to maintain reliable service.

Identification/Justification Process

Candidates for replacement are identified based on age and/or operating condition, both indicators of potential failure. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
2	1	20-50	18-20	18-20	59-93

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	9-14
Northeast	12-17
Central	7-13
Susquehanna	9-14
Harrisburg	12-19
Lancaster	10-16

Distribution Substation Circuit Breakers

Program Description and Purpose

Proactive replacement of substation circuit breakers ("CBs") based on asset health and risk factors produced by data analytics models to maintain reliable service. This program includes the replacement of 12 kV circuit breakers.

Identification/Justification Process

Candidates for replacement are identified based on data analytics risk models that consider age, mis-operation history, repair history, obsoletion, and load transferability. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window. Furthermore, assets with chronic issues and high O&M trails are also factored into the proactive replacement scope.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
43	37	60-80	65-85	50-70	255-315

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	65-75
Northeast	35-45
Central	45-55
Susquehanna	32-42
Harrisburg	29-39
Lancaster	49-59

69/12 kV & 138/12 kV Transformer Replacement

Program Description and Purpose

Proactive replacement of distribution substation transformers based on asset health and risk factors produced by data analytics models to maintain reliable service. This program includes the replacement of 69/12 kV and 138/12 kV transformers.

Identification/Justification Process

Candidates for replacement are identified based on data analytics risk models that consider age, dissolved gas analysis trends/analytics, repair history, obsoletion, and load transferability. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window. Furthermore, assets with chronic issues and high O&M trails are also factored into the proactive replacement scope.

PPL Electric Utilities Corporation

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
4	5	4-8	6-10	6-10	25-37

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	6-9
Northeast	5-6
Central	5-7
Susquehanna	3-5
Harrisburg	1-2
Lancaster	5-8

Distribution Substation DC Equipment

Program Description and Purpose

Programmatic replacement of distribution substation DC equipment based on asset health and risk factors produced by data analytics models to maintain reliable service. This program includes the replacement of 24 V, 48 V, and 125 V batteries, chargers, and related equipment.

Identification/Justification Process

Candidates for replacement are identified based on age, operating issues, availability of spare parts, and failure trends. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window. Furthermore, DC assets with chronic issues and high O&M trails are also factored into the proactive replacement scope.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
3	2	30-35	30-35	30-35	95-110

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	26-29
Northeast	18-21
Central	15-18
Susquehanna	13-15
Harrisburg	13-15
Lancaster	10-12

Substation Animal Guarding

Program Description and Purpose

Improvements to existing distribution substation equipment via the proactive installation of animal guards to prevent animal contacts and maintain reliable service. Guarded equipment includes transformer bushings, circuit breakers, fuse/disconnect switches, bus supporting insulators, surge arresters, station service transformers, PTs, and cable terminations. Future investments could be made in pilot products like internal perimeter electric fences for comprehensive rodent deterrents at high animal contact risk locations.

Identification/Justification Process

Distribution substations are regionally prioritized based on historical animal-related service outages (both at the substation and within a 1-mile perimeter), number of customers served, substation load, and transferability. High priority substations are animal guarded first with the lower priority substations guarded in outer years.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
3	1	9-15	5-10	5-10	23-39

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	9-11
Northeast	1-5
Central	2-5
Susquehanna	3-5
Harrisburg	6-8
Lancaster	2-5

12 kV Underground Bus Tie & Transfer Cable Replacement

Program Description and Purpose

Proactive replacement of distribution substation underground bus tie and transfer cables based on asset health and risk factors produced by data analytics models to maintain reliable service. This program includes the replacement of all 12 kV underground cables within the perimeter of the substation yard.

Identification/Justification Process

Underground bus tie and transfer cables are selected for proactive replacement based on data analytics risk models that quantify cable health and risk, and provide a priority ranking based on factors such as age, repair history, installation type, length, loading, etc. Scope is additionally identified through inspection feedback and other work.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
4	1	8-13	7-12	5-10	25-40

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	5-8
Northeast	2-5
Central	7-9
Susquehanna	2-4
Harrisburg	7-9
Lancaster	2-5

LTN Upgrades

Program Description and Purpose

The purpose of this program is to install remote monitoring and control equipment in all Low Tension Network ("LTN") vaults, upgrade network devices up to the latest standard, replace vault equipment near its end of useful life, and install telemetry on secondary network cable. These improvements will allow for safer operation of LTNs, reduce maintenance costs, reduce failed equipment requiring replacement, and provide better data for asset planning and investments.

Identification/Justification Process

Rollout of this program began in the Lehigh and Harrisburg regions. By the completion of this program in 2027, all LTN vaults will receive automation.

Scope

Actual, Forecast, and Planned Replacements in Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
29	37	164-184	185-214	8-12	423-476

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Units
Lehigh	60
Northeast	107
Central	76
Susquehanna	31
Harrisburg	84
Lancaster	92

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$6.87	$4.90	$4.33	$7.44	$5.91	$29.45

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Reliability

This category includes deployment of Smart Grid devices and distribution circuit upgrades to address reliability issues identified through inspections or various circuit or customer level performance metrics.

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$9.19	$15.62	$11.31	$11.55	$10.37	$58.04

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Distribution Reliability Preservation

Program Description and Purpose

Upgrades to the distribution system as justified by regional reliability supervisors to improve reliability. Improvements are targeted towards WPCs, circuits with a history of customer complaints, or recommendations as a result of PCAs. PCAs are detailed reliability and operational analysis performed on 25% of a region's distribution circuits per year. Additional work is scoped on the basis of Customers Experiencing Multiple Interruptions ("CEMI"), and Customers Experiencing Multiple Momentary Interruptions ("CEMMI").

Identification/Justification Process

Projects are identified and submitted for both small and large-scale circuit improvement. These projects are ranked utilizing PPL Electric's investment prioritization tool to ensure funds are directed towards the most cost-effective projects. The number of projects and locations may vary depending on areas with reliability concerns. Examples include, but are not limited to, installation of fuses, fault indicators, reconductoring of vintage conductor, upgrading conductor to reduce impact of vegetation related service outages, and relocating sections of lines that may be inaccessible or prone to vegetation related service outages.

It should be noted projects vary significantly in size, which can result in material swings in the number of planned projects.

Scope

Actual, Forecast, and Planned Units					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
58	226	341-376	20-35	20-35	665-730

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations

Locations are identified based upon emergent reliability needs.

Reliability Preservation Emergent

Program Description and Purpose

Remediation of issues primarily associated with secondary voltage and emergent small-scale customer reliability needs in order to improve reliability.

Identification/Justification Process

Work is identified by line crews, as well as through customer calls, and is completed to avoid potential service outages, power quality concerns and safety issues. Examples include, but are not limited to, modifying capacitance to address voltage concerns, installing fusing to aid in sectionalizing, and replacing transformers to resolve transformer overload. Budget recommendations are based on historical trends of hours charged.

Scope & Locations

Scope and locations are determined as emergent needs arise.

System Reliability Improvement Projects

Program Description and Purpose

Large-scale improvements to distribution circuits with a history of poor reliability. This program addresses long-term projects, primarily aimed at circuits or substations with poor performance or reliability concerns. However, other proactive long-term projects with proven reliability benefit are included.

Identification/Justification Process

As shown in Figure 4, PPL Electric has experienced increasing storms in its territory which have resulted in negatively trending reliability. Poorly performing circuits are identified through the WPC process or the newly added Circuit Hardening Initiative that focuses on improving system resiliency and SAIFI. The Circuit Hardening Initiative enables engineers to collaborate across departments to evaluate and justify projects that aim to address both large and small scale deficiencies, such as circuit reconfigurations and relocations, device installations, new ties, new lines and terminals, or the installation of substations for increased reliability. More specifically, some of these projects may include removing inaccessible line sections or sections of line in areas of heavy vegetation along the road with increased rights-of-way or undergrounding the section of line. These projects will be constructed with the Company's hardening standards (i.e., increased poles and wire sizes). Projects are approved by supervisors and vetted against other projects for scheduling based on historical reliability, potential benefit, and cost. Worst Performing Circuits, are evaluated quarterly to determine additional reliability projects. Projects may span multiple years and are listed in the years they are planned to go in service. Scope is expected to increase in outer years as additional circuits and projects are identified. Additionally, PPL Electric monitors large customer impact outages on a daily basis. A circuit that begins to show reliability deterioration and notable impact on reliability metrics requires a root cause analysis. Such analysis can result in the identification of a long-term project.

Note that the projects vary significantly in size, which can result in material swings in the number of planned projects.

Scope

Actual, Forecast, and Planned Projects					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
5	7	17-22	310-370	255-305	594-709

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

PPL Electric Utilities Corporation

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	139-164
Northeast	89-112
Central	75-96
Susquehanna	102-121
Harrisburg	170-192
Lancaster	19-24

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$19.23	$21.11	$23.05	$314.53	$300.85	$678.77

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Unreimbursed Highway Relocations

Program Description and Purpose

Unreimbursed customer requested relocations of PPL Electric distribution facilities in support of highway and bridge projects throughout service territory.

Identification/Justification Process

The customers (project sponsors) include PennDOT, the PA Turnpike Commission, and various counties and municipalities. PPL Electric and the project sponsor execute a reimbursement agreement, and PPL Electric is reimbursed for its work based on the "pole count method," as defined in PennDOT's DM-5 manual. Historically, reimbursement for distribution projects is approximately 35%.

To accommodate highway relocations and other municipal projects, approximately 70-120 projects per year are placed in service. PPL Electric typically is notified of distribution relocation work 12 months or less before the start of requested utility relocation activities.

Scope & Locations

Scope and locations are determined as requests are received.

Actual, Forecast, and Planned Expenditures (in millions)

PPL Electric's expenditures to complete highway relocation projects are the net of total expenditures minus the project sponsor's reimbursements.

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$8.87	$10.12	$4.74	$4.26	$4.71	$32.70

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Protection and Control

Program Description and Purpose

Proactive replacement of protection and control equipment to maintain reliable distribution service to customers. Replacement of legacy relays with modern microprocessor relays will also improve fault monitoring and diagnosis processes and will provide added insight into circuit breaker health and risk. Replacement of obsolete Supervisory Control and Data Acquisition ("SCADA") protocols and equipment will also enable relays to perform properly.

PPL Electric Utilities Corporation

Identification/Justification Process

Candidates for replacement are identified based on obsolescence, availability of vendor support, age, and automation enhancement potential. Once identified, replacement of these facilities is coordinated and aligned with the replacement of other assets at the same substation within the five-year planning window.

Scope

Actual, Forecast, and Planned Projects					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total Scope**
19	130	170-200	145-160	20-30	484-539

**2025 Forecast includes actual costs through June 30th and the remaining plan for the year.*

Locations (Approximate total over 5-year plan)

Region	Projects
Lehigh	58-68
Northeast	94-101
Central	81-91
Susquehanna	60-70
Harrisburg	84-92
Lancaster	107-117

Actual, Forecast, and Planned Expenditures (in millions)

Actual, Forecast, and Planned Expenditures					
2023 Actual	**2024 Actual**	**2025 Forecast***	**2026 Planned**	**2027 Planned**	**Total**
$3.34	$7.58	$37.36	$13.16	$5.73	$67.17

**2025 Forecast includes actuals though June 30th and the remaining plan for the year.*

PPL Electric Utilities Corporation

Appendix A: Average Age of Major Units of Property

The below chart is a summary of key distribution assets, targeted for planned replacement and proactive installation.

Average Age of Major Units of Distribution Property		
Utility Account	Description	Avg Asset Age
362.0 - Station Equipment	DC Sytem Equipment	22
362.0 - Station Equipment	Substation Animal Guards	13
362.0 - Station Equipment	Power Circuit Breakers	36
362.0 - Station Equipment	Power Transformers	44
362.0 - Station Equipment	Protection and Control Equipment	55
364.4 - Poles and Fixtures	Distribution Wood Poles	45
365.0 - Overhead Conductors, Device	Distribution Animal Guards	10
365.0 - Overhead Conductors, Device	OH Primary Conductor	53
365.0 - Overhead Conductors, Device	Air Break Switches	16
365.0 - Overhead Conductors, Device	Automatic Switches (Primarily OCRs/VCRs)	13
365.0 - Overhead Conductors, Device	Disconnect Switches	38
367 - Underground Conductors	UG Primary Conductor (includes Getaways and Cross Yard Ties)	30
366.0 - Underground Conduit	Equipment Foundation, Man Holes, Transformer Vaults (excl Conduit)	27
368.4 - Submersible or Padmt Type	UG Transformers (include LTN Transformers and Network Protectors)	28

PPL Electric Utilities Corporation

Appendix B: Asset Contribution to Reliability Metrics

The below table provides a summary of customers interrupted ("CI") and Customer Minutes Interrupted ("CMI") by failed component. Note that both transmission and distribution substation outages are included in the Substation component asset type.

Component Asset Type	Component Desc	2020		2021		2022		2023		2024	
		CI	CMI	CI	CMI	CI	CMI	CI	CMI	CI	CMI
Distribution	OH-Capacitor Bank	490	12,697	1,020	50,662	2,593	58,670	1,135	49,329		
Distribution	OH-Lightning Arrester	2,702	290,321	2,151	293,442	3,979	326,471	4,685	373,443	1,215	242,699
Distribution	OH-Other Equipment(explain)	6,109	451,306	3,456	313,318	10,372	824,157	1,755	269,398	3,062	277,129
Distribution	OH-Pole/Arms Attachments	35,347	3,959,531	43,737	5,505,965	54,881	6,093,564	42,745	5,103,878	52,584	8,898,926
Distribution	OH-PRI Splices and Connectors	15,181	980,526	15,620	1,443,678	10,386	1,359,976	13,340	1,601,111	16,463	2,135,092
Distribution	OH-Primary/Neutral	116,882	14,222,141	103,465	13,187,676	88,710	11,325,422	78,887	12,524,653	113,600	19,132,653
Distribution	OH-SEC Splices and Connectors	1,710	151,429	1,690	208,053	2,621	257,425	1,913	236,688	1,889	214,358
Distribution	OH-Secondaries/Services	3,283	370,513	3,369	379,299	4,208	598,674	3,093	301,747	4,314	613,787
Distribution	OH-Switch/Automatic	15,214	1,330,628	25,270	2,014,136	32,441	2,419,922	24,882	2,624,766	27,593	3,486,750
Distribution	OH-Switch/Manual/AB/Disc/OS/LBD	6,291	401,764	5,692	297,479	6,712	543,795	6,840	513,781	7,010	2,324,929
Distribution	OH-Tap Fuse/Cutout	7,764	841,505	7,116	925,719	8,950	984,354	7,523	1,003,536	8,876	2,037,594
Distribution	OH-Transformer	7,292	1,225,848	8,189	1,171,421	6,862	1,260,106	5,429	732,841	5,233	1,235,849
Distribution	OH-Transformer Fuse/Cutout	20,863	2,208,699	18,545	2,025,416	18,616	2,071,875	16,754	1,944,057	15,688	2,120,017
Distribution	UG-Elbows	480	274,811	937	212,896	144	38,867	412	88,214	254	48,470
Distribution	UG-Lightning Arrester	120	21,331	76	12,064	148	22,618	139	8,315	34	6,857
Distribution	UG-Load Break Junctions	73	16,468	164	58,516	70	18,213	12	3,395	95	41,801
Distribution	UG-Low Tension Network	5	315			3,070	53,304				
Distribution	UG-Other Equipment(explain)	1,444	155,257	7	795	130	18,348	54	6,717	265	60,309
Distribution	UG-Pads/Vaults/MHs & Splice Boxes	102	18,971	801	150,036	408	64,039	432	67,739	147	55,498
Distribution	UG-PRI Splices and Connectors	343	38,591	791	53,784	466	19,972	2,772	256,673	693	179,065
Distribution	UG-Primary Cable/Neutral	15,006	2,304,340	12,565	2,377,282	16,972	2,727,774	11,435	2,047,963	16,746	3,263,627
Distribution	UG-Riser Pole Equip & Devices	306	41,973	948	131,556	2,969	268,668	875	135,049	3,221	406,588
Distribution	UG-SEC Splices and Connectors	2	324	33	1,193	63	11,420	6	513	13	3,020
Distribution	UG-Secondaries/Services	310	50,241	377	80,910	563	131,513	303	63,036	478	92,554
Distribution	UG-Switchgear	441	87,554	712	142,733	1,164	160,148	874	240,217	3,125	308,646
Distribution	UG-Transformer/Transformer Fuse	1,041	232,250	2,915	336,981	2,647	507,851	2,085	347,343	1,758	443,608
Substation	SUB-Circuit Breaker	28,289	1,766,321	9,349	202,774	1,072	10,542	2,685	104,720	4,149	78,109
Substation	SUB-Control/Relay			730	9126.98	622	26665.14				
Substation	SUB-Insulator			3539	31055	14572	233048.97	1892	105952	3334	25387.29
Substation	SUB-Lightning Arrester					986	83455.04				
Substation	SUB-Other Equipment(Explain)	35,104	366,321	499	14,436	56	12,472	84	8,453	952	140,595
Substation	SUB-Power Fuse	2,823	26,593	67	355	1,952	11,712				
Substation	SUB-Structure							7885	134028.99		
Substation	SUB-Switch/Automatic							79	7034.95	1288	77489.9
Substation	SUB-Switch/Manual/AB/Disc/LBD	22,157	486,661	4	1,982					1,825	104,495
Substation	SUB-Transformer	7,719	118,942					1,804	14,468	71	16,717
Total		354,893	32,454,169	273,834	31,634,739	299,405	32,545,042	242,809	30,919,056	295,975	48,072,621